

**ANNUAL REPORT
OF THE
INDIAN CENTRAL COTTON COMMITTEE,
BOMBAY,
FOR THE
YEAR ENDING 31st AUGUST
1936.**

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Annual Report of the Indian Central Cotton Committee for the year ending 31st August 1936.

CHAPTER I.

As a result of one of the recommendations of the Indian Cotton Committee of 1917-18, the Indian Central Cotton Committee was constituted by the Government of India in the Department of Revenue and Agriculture, in their Resolution No. 404/22, dated the 31st March 1921. Originally its functions were purely of an advisory character but with its incorporation under the Indian Cotton Cess Act in 1923, the Committee became an administrative body having at its disposal funds "for the improvement and development of the growing, marketing and manufacture of cotton in India". The Committee thus exercises its functions in a dual capacity. Firstly, it advises the Government of India, local Governments and Indian States on subjects connected with the growing and marketing of cotton and brings to their notice matters which, in its opinion, require attention. Secondly, it provides funds for research into cotton problems of an All here cotton is an important crop, and improved varieties of cotton. The work has passed the experimental stage as will be seen in Chapters IV and V of this report

The Committee also serves as a common meeting ground for all branches of the cotton industry, since all the main interests associated with cotton, viz., the grower, the ginner, the exporter, the millowner and the agricultural expert are represented on it. Whilst the Committee's constitution thus ensures a broad outlook on the many problems affecting the cotton industry, its primary concern is the interest and welfare of the cotton grower.

PERSONNEL

2 In Appendix I will be found a list of members of the Committee as it stood on the 31st August 1936. Under the Indian Cotton Cess Rules, members who are not ex officio members, hold office for three years and one third of their number retire each year in rotation.

Dr F J F Shaw, O.I.E., I.A.S., Offg Agricultural Expert to the Imperial Council of Agricultural Research and an ex officio member of the Committee, died during the year and the Committee, at its meeting in August 1936, recorded its appreciation of the services rendered by him not only to the Committee but also to the country as a whole.

SUB COMMITTEES

3 Most of the detailed work of the Committee is carried on by means of Sub Committees and thereby much of its time is saved at its half yearly meetings. The Committee is greatly indebted to the members of the various Sub Committees for their invaluable assistance and hearty co-operation in furthering the work of the Committee, more particularly are its thanks due to the members of the Standing Finance and Local Sub Committees who are required to attend to the business of the Committee at more frequent intervals.

The functions of the various Sub Committees are detailed below and their composition as on the 31st August 1936 is given in Appendix II.

(a) The Standing Finance Sub Committee is a statutory Sub Committee and is the principal executive body of the Committee. By a resolution of the Committee one of the members of this Sub Committee must be a representative of cotton growers. Eight meetings of this Sub Committee were held during the year.

(b) The Local Sub Committee deals with matters not involving finance, which cannot be dealt with at the half yearly meetings of the full Committee. One meeting of this Sub Committee was held during the year.

(c) The Cotton Ginning and Pressing Factories Sub Committee is appointed by statute to deal with matters arising out of the Cotton Ginning and Pressing Factories Act of 1925. This Sub Committee did not meet during the year. The more routine work of this Sub Committee was disposed of by the Local Sub Committee.

(d) The Agricultural Research Sub Committee ordinarily assembles half yearly during the meetings of the full Committee. It reports on the progress made on schemes financed by the Committee, examines proposals for new schemes or extensions of those already in operation and considers the reports of research students.

(e) The Research Students Selection Sub Committee, as its name implies, selects students to whom scholarships or training grants are awarded for the purpose of undergoing training in research in the several sciences relating to cotton. One meeting of this Sub Committee took place during the year.

(g) *The Sub Committee on Malpractices* was originally formed with the object of dealing with all references concerning abuses and malpractices in regard to Indian cotton. As it was felt that the work of this Sub Committee could conveniently be dealt with by the Cotton Ginning and Pressing Factories Sub Committee, the full Committee resolved at its meeting held in January 1936 to discontinue it.

(h) *The Forecast Improvement Sub Committee* usually meets half yearly, its principal business being the improvement of the cotton forecasts of India.

(i) *The Special Sub Committee on Wider Markets* was appointed in 1933 with the object of examining the question of finding wider markets for Indian cotton. It met twice during the year under report.

(j) *The Standards Sub Committee* was constituted in April 1933 and is concerned with the preparation for use in India of universal standards of certain growths of cotton dealt with in common both by the East India Cotton Association and the Karachi Cotton Association and of certain other varieties with which only the former Association is concerned. Six meetings of this Sub Committee were held during the year.

In addition to the abovementioned Standing Sub Committees, special Sub Committees are appointed from time to time to deal with specific matters which do not fall within the purview of any of the other Sub Committees.

4 Whilst the Committee is representative of practically all sections of the cotton trade in India, it also enjoys the privilege of deputing representatives to serve on other bodies. Thus Sardar Rao Bahadur Bhim bhai Ranchodji Naik represents it on the Imperial Council of Agricultural Research and he along with Mr N M Deshmukh and Sardar Sampuran Singh represented the Committee on the Board of Directors of the East India Cotton Association up to 31st March 1936, when the last two were replaced by Mr M P Kolhe, and Mian Nurullah. On the Joint Sub Committee of the Imperial Council of Agricultural Research and of the Indian Central Cotton Committee in connection with the investigation into the cost of growing cotton, sugarcane and their rotation crops the Committee is represented by Sir Purshotamdas Thakurdas, Sardar Rao Bahadur Bhim bhai Ranchodji Naik, Mr J Vonesch, Mr Chunilal B Mehta, Mr Chunilal B Parikh (representing the East India Cotton Association), and the Secretary. The representatives of the Committee on the Board of Governors of the Institute of Plant Industry, Indore, are the President, the Vice President (S P rebhunand Patel - 1936-1937),

Mr

Rao

The

Master Cotton Spinners' and Manufacturers' Associations

MEETINGS.

5 The Indian Central Cotton Committee held two meetings during the year under review, both at Bombay. The first meeting took place on the 13th and 14th January 1936, and the following were among those who attended it by invitation —

Sir Richard H Jackson, Chairman, Lancashire Indian Cotton Committee, the Hon'ble Dewan Bahadur S T Kambl, J P, Minister for Agriculture, Government of Bombay, the Hon'ble Khan Bahadur D B Cooper, J P, Member for Revenue and Finance, Government of Bombay, Mr C G Treke, ICS, Secretary to the Government of Bombay, Finance Department, Mr N O Mehta, ICS, Secretary, Imperial Council of Agricultural Research, Mr N Brodie Director, Industrial Intelligence and Research Bureau, Indian Stores Department, Mr W D M Clarke, His Majesty's Trade Commissioner at Bombay and Mr H C Short, Cotton Commissioner, Lancashire Indian Cotton Committee

The second meeting, which was held on the 17th and 18th August 1936, was honoured by the presence of His Excellency the Hon'ble Sir Robert Duncan Bell, KCSI CIE Acting Governor of Bombay. Amongst the other visitors present were Mr C H Bristol, ICS Private Secretary to His Excellency the Governor of Bombay, Mr P K Norris Agricultural Commissioner, U.S.A. Department of Agriculture and Mr N Brodie, Director, Industrial Intelligence and Research Bureau, Indian Stores Department

A list of the more important resolutions passed at these two meetings will be found in *Appendix III*

STAFF

6 Mr P H Rama Reddi continued to hold charge of the office of Secretary throughout the year

The temporary gazetted post of Personal Assistant to the Secretary, held by Mr C J Bocarro, was abolished during the year and a permanent gazetted post of Assistant Secretary was created to which Mr Bocarro was appointed

Dr Nazir Ahmad held the post of Director of the Technological Laboratory during the year and Mr R D Mihra that of Publicity Officer

I am happy to be able to record once again my sincere appreciation of the loyal co-operation which I continued to receive during the year from every member of the office staff

PROVINCIAL COTTON COMMITTEES

7 The value of Provincial Cotton Committees in dealing with problems of provincial importance has been stressed in previous reports and once more the Committee records its view that where such Committees are actively functioning the work done by them has materially assisted the Committee in arriving at decisions on subjects referred to it Local problems can be visualised in their true perspective best by Provincial Committees and therefore the discussions and the decisions of such Committees help to bridge over difficulties which the absence of the knowledge of local conditions unavoidably creates During the year under review, the Sind and the Punjab Cotton Committees each met once and much useful work was transacted by them the Madras Cotton Committee dealt with the scheme for the improvement of *Mungari* cotton by correspondence without actually meeting It is hoped that the coming years will witness a revival of the activities of Provincial Cotton Committees

CHAPTER II.

WORK OF THE YEAR

COTTON POLICY.

8 The last Annual Report referred to the conclusions arrived at by the Committee on the investigation of long and medium staple in the. Whilst these investigations were threatened Japanese boycott of Indian cotton in 1933 and the consequent growing apprehension of the serious risk India ran by depending too much on the limited market for her short stapled cotton, they have yielded information which will be of considerable value in framing the future cotton policy of the country in view of the world's present tendency towards the spinning of finer counts for which short staple cotton is unsuitable. The survey further brought to light the fact that apart from these areas which were suitable for the production of long or medium staple strains and where already the cultivation of such types was on hand, the adoption of dry farming methods of cultivation in certain tracts would overcome the difficulties imposed on the growing of long and medium staple cotton by reason of the precarious rainfall of the tracts in question. Investigation on these lines is accordingly being undertaken in the Westerns tract of Bijapur district in the Bombay Presidency and in the Raichur and Gulbarga districts of the Hyderabad State with the aid of grants to the Imperial Council of Agricultural Research, who have already in operation dry farming schemes in those tracts. A further step forward has been taken in connection with the improvement of *Dholleras* cotton, as during the year the Committee sanctioned a scheme having for its object the tackling of the cotton problems of the *Dholleras* tract—an extensive area to which little attention had been paid in the past. The collection of *Iran* cottons for the purpose of evolving early *herbaceum* strains suitable to some parts of the *Dholleras* tract was also set in motion during the year. The eradication of the Pink Boll worm in the United Provinces which is expected to lead to the improvement of the quality of cotton in the United Provinces has definitely proceeded forward with the introduction of the Cotton Pest Control Bill in the United Provinces Council.

The activities of the Committee are steadily forging their way into the agricultural economy of the country and those acquainted with its history will not have failed to notice how the work of the Committee has extended and expanded in the course of years and how certain schemes of the Committee have, as through a process of natural evolution, found their counterpart in schemes of another type. For instance, the old breeding and survey and mycological schemes have developed into seed distribution and extension schemes and from entomological schemes have sprung up schemes for clean up propaganda and schemes for popularising the use of plant pullers for uprooting cotton stubbles.

It has been urged in some quarters that the Committee should extend its activities by including in its programme investigations on soil fertility and on improvements in the method of compost manufacture. The importance of these problems is fully realised by the Committee, but it has always held the view that work on these lines is the function of Provincial Agricultural Departments and that it is not a special problem of cotton cultivation. The study and demonstration of methods for the maintenance of soil fertility is a fundamental part of the work of Agricultural Department and they are already devoting considerable attention to it. The Committee has deliberately concentrated on problems connected with cotton in preference to that affecting all crops in all parts of the country. The Committee aims at supplementing and not supplanting the work of the Agricultural Department and so far there has been no occasion for it to deviate from this accepted principle.

COMPACT BLOCK OF LONG STAPLE COTTON IN SIND

9. It was stated in last year's report that the Government of Bombay "the Committee's recommendation for block of long staple cotton in concurrence with the conclusion arrived at by the Chief Agricultural Officer in Sind that the area south of the Jodhpur Railway was the most suitable for such purpose. During the year under review, the Cotton Ginning and Pressing Factories (Bombay Amendment) Act, 1936, which provides for the licensing of gins and presses, was passed into law and was made applicable in the first instance to the province of Sind, with effect from such date as the Local Government may, by notification, appoint. Owing to certain difficulties which subsequently arose, the issue of the notification has, however, been delayed. The Act has for its object the prevention of malpractices arising from the watering, mixing or admixture of cotton and the desirability of the early application of the Act to Sind, where the malpractices referred to are non-existent or only in their incipient stage, led the Committee at its meeting in August 1936, to pass a resolution urging on the Government of Sind the necessity of taking very early steps to make the Cotton Ginning and Pressing Factories (Bombay Amendment) Act effective in that province by framing rules as early as possible before malpractices became established in the newly developed cotton tracts. With regard to the reservation of compact block for the growing of superior varieties of cotton, the Bombay Government have declared that in accordance with the policy of the Agricultural Department in Sind the seed of the improved varieties 289F and 289F(1) only will be distributed in this area. In the opinion of the Local Government the application of the Cotton Transport Act to the proposed block in order to prevent the importation of kapas from outside the area for purposes of mixing presents practical difficulties. They consider that the absence of natural boundaries around the cotton growing areas and the lack of regular routes of communications in Sind would make the enforcement of the Act both costly and difficult. Should, however, experience

indicate at a later stage of development of the area that it is desirable to prohibit the import from the Punjab by rail of inferior seeds into Sind for sowing purposes, necessary action will be taken. It is felt, however, that such action would be possible only when an adequate supply of the seed of the varieties 289F and 289F(1) are available for the tract—a condition which, it is estimated, would take two years to fulfil.

SPREAD OF GARROW HILL COTTON IN THE CENTRAL PROVINCES

10 The recommendation of the Central Provinces Provincial Cotton Committee, which was endorsed by the Committee last year for the adoption of legislative measures for the eradication, from the Central Provinces and Berar, of *Garrow Hill* cotton, a very inferior short staple but prolific variety, which has lowered the reputation of even the superior types of cotton in the tract, was accepted by the Central Provinces Government. A Bill* for the prohibition of the cultivation of *Garrow Hill* cotton in the Central Provinces was introduced in the Central Provinces Legislative Council and has been referred to a Select Committee.

BOMBAY COTTON CONTROL ACT

11 As foreshadowed in last year's report, the Bombay Government introduced in the Legislative Council in September 1935, the Bombay Cotton Control Bill, having for its object the prohibition of the cultivation mixing or possession of *Goghar*, an inferior type of cotton which was spreading to an alarming extent in the Surat tract and threatening the reputation of 1027 A L F to the detriment of the cotton growers of Surat. With commendable expedition the Bill passed into law in November 1935. The Committee is confident that this piece of legislation will go a long way towards improving the quality of cotton of the Surat tract and that the benefits to the grower expected from the Act will soon be realised. A copy of the Act will be found in Appendix V.

As *Goghar* was spreading also in the Baroda State whose territory is interlaced with the Bomhay Gujerat, the Durhar, by notification, applied the provisions of the Bomhay Cotton Control Act, with slight modifications, to the State.

LANCASHIRE INDIAN COTTON COMMITTEE

12 The work of the Lancashire Indian Cotton Committee as recorded in its 2nd Annual Report evoked the commendation of the Indian Central Cotton Committee at its meeting in August 1936, when the report was considered. Whilst expressing its satisfaction that through the sustained efforts of the Lancashire Committee the taking of Indian cotton by Lan-

the Committee could not avoid the feeling
isted for the more extended use of Indian

On the basis of a production of yarns up
een roughly computed that Lancashire's

* This Bill has since become law.

requirements of raw cotton amount to 1,363,000 bales and for much of this Indian cotton is suitable. Even allowing for the fact that Lancashire mills employ a certain percentage of Indian cotton in the manufacture of yarns up to achievement the position is

The Committee is not unmindful of the existence of factors which militate against the adoption in manufacture of a class of cotton not previously employed and of possible prejudices to be overcome anterior to such employment, but it is confident that with the judicious use of the weapon of propaganda, which has already proved to be effective, reinforced with the experience of the past, the aspect of the problem will be changed in the not distant future. The large increase in the takings of Indian cotton in the last three years is a striking testimony to the efficiency of the organisation and propaganda of the Lancashire Indian Cotton Committee. It has been suggested to the Lancashire Indian Cotton Committee that one direction in which the use of Indian cotton in the United Kingdom could be furthered was by approaching the subsidiary industries like the woollen, hosiery, gun cotton and explosives, motor car, etc., which consume a certain quantity of cotton in the manufacture of various articles, and by impressing upon them the desirability of using Indian cotton in preference to foreign growths. The Lancashire Indian Cotton Committee is fully assured of the goodwill and co-operation of the Indian Central Cotton Committee in the mutual aim of the two bodies for the more extended use of Indian cotton in the United Kingdom.

The following figures of consumption of Indian cotton by, and the imports of Indian cotton into, the United Kingdom are very illuminating in regard to the achievements of the Lancashire Indian Cotton Committee and the progress made by Indian cotton in Great Britain —

Year (August 1 to July 31)	Lancashire Indian Cotton Committee	Liverpool Cot- ton Association	Depart of Com Intelligence & Statistics Calcutta	* Total exports to all countries
	Mill ons of lbs (Consumption)	Thousands of bales (Running) (Imports into U K)	Export to U K	(Thousands of bales of 400 lbs)
1928-29	72	228	233	3,933
1929-30	73	291	286	3,868
1930-31	98	281	274	3,729
1931-32	72	137	128	1,592
1932-33	49	230	257	2,868
1933-34	92	362	367	3,270
1934-35	133	394	374	3,115
1935-36	Figures not available	547	533	3,826

* From 1931-32 exports from Kathiawar Ports are included.

THE COTTON TRANSPORT ACT

13 At the request of the Indian Central Cotton Committee the Government of India passed in 1923 the Cotton Transport Act, which enables local Governments to prohibit the import for purposes of mixing and substitution of inferior cotton into areas growing superior varieties within their jurisdiction.

Madras—There was no change in the protected areas in the Madras Presidency

Bombay—Only one of the seven protected areas notified in the Bombay Presidency changed during the year under report. It was stated in the last year's report that the Committee approved of a proposal of the Director of Agriculture, Bombay Presidency, to fix the Mahu river as the northern boundary of the Nerhudda Mabi protected area. The Local Government have since accepted this proposal and have notified the change accordingly.

Central Provinces—During the year the Narsinghpur Sub Division was included in the protected area with the object of preventing the import of Bengal's cotton into the province for the purpose of mixing.

Indian States—There was no change in the protected areas in Hyderabad, Indore, Sangli, Rajpipla and Chotta Udepur which are the only Indian States that have such legislation in force.

THE COTTON GINNING AND PRESSING FACTORIES ACT

14 During the year under report nearly a score of cases of infringement of the Act were brought to the notice of the authorities concerned. In some cases either the wrong year or indecipherable or incorrect marks were put on bales, while in one or two cases press marks were absent. In almost all cases the factory owners were warned, in only one case in the United Provinces a fine of Rs 25 was imposed on a factory owner. In cases where breaches were due to misunderstanding of the procedure, instructions as to the proper method of marking bales were issued to factory owners and they were directed to be more careful in future. In one case incorrect marks a District Magistrate held a meeting of the East India Cotton Association and unless it was proved by the evidence of the clerk and considered that the production Government in much greater expense than fines. The East India Cotton Association,

to whom the matter was referred, held that if this attitude were adopted the Act would remain a dead letter and they suggested that the difficulty and expense of producing evidence could be got over by issuing a commission to Bombay to take the evidence of the seller, one of the arbitrators and the survey clerk.

Mention was made in last year's report of the warning given by a Collector to a factory owner for the use of unauthorised weights in the factory and of the fact that the attention of the Local Government was drawn to the leniency of the punishment. The Local Government concerned issued a circular to all District Magistrates instructing them to institute prompt proceedings against factory owners caught using unauthorised scales or weights as such practices involved loss to the illiterate cultivator.

Most cotton producing Indian States have fallen into line with British India in legislating for the purpose of the marking of bales and the submission of weekly returns of cotton pressed. During the year, the Malwa and Khairpur States introduced similar legislation thus bringing the total to 67. Out of these weekly press returns were received from sixty, Gwalior being amongst those from whom such returns were not received.

LICENSING OF GINNING AND PRESSING FACTORIES

15. It is gratifying to record that one of the first pieces of legislation advocated by the Committee almost since its inception has at last found a place in the statute book of the Bombay and Central Provinces Governments. This step was taken as the result of the decision of the Government of India not to undertake legislation themselves for the licensing of ginning and pressing factories but to leave it to local Governments to do so if they desired. Acts amending the Cotton Ginning and Pressing Factories Act were passed by the two Local Governments mentioned making it obligatory on all cotton ginning and pressing factories situated in areas to which the Act may be applied to take out licenses, and prohibiting watering mixing or admixtures of cotton. It is the belief of the Committee that these measures will go a long way in suppressing the malpractices which are detrimental to the interests of the cotton grower as they mar the fair name of Indian cotton both in India and abroad. Although the Bombay Act has, in the first instance, been made applicable to Sind—now a separate province—it will not, as originally hoped, be in operation during the revenue year 1936-37, as the Sind Government have not been able to pass the necessary rules under the Act before the commencement of the cotton season. The Bombay Government have under contemplation the application of the Act to other parts of the Presidency. Owing to the enactment of similar legislation by the Central Provinces Government, the Indian Central Cotton Committee, at its meeting in August 1935, passed a resolution urging on the Bombay Government to apply the Act to the Khandesh tract of the Bombay Presidency. The Central Provinces Act extends to the whole of the province and will be in operation as soon as the required rules which are under the consideration of the Local Government have been framed. Copies of the Bombay and Central Provinces Amendment Acts will be found in Appendices I I and VII. The Punjab Government have also under consideration the introduction of a similar measure, the chief problem there being the mixing of cotton. Among Indian States, Hyderabad has been a pioneer in the field of legislation of this type, the licensing of cotton ginning and pressing factories being in operation there from 1931.

MALPRACTICES

16. The East India Cotton Association reported five cases of bales having been rejected as "watered off" allowance on account of the cotton being heavily watered. These bales were from Navari and Skendarni (East Khandaik), in the Bombay Presidency, Vridhampur in the Madras Presidency, and Mandi Sirkar in the Punjab. Certified copies of entries in the press registers pertaining to the bales in question were called for under Section 8(3) of the Cotton Ginning and Pressing Factories Act and the information therewith was passed on to the East India Cotton Association.

An exporting firm in Bombay reported that two lots of 48 and 41 bales each of cotton purchased by them were found to be heavily watered. As the press marks showed that the bales came from Arvi, a certified copy of the entry in the press register relating to the bales in question was called for and the information was supplied to the firm concerned.

Complaints were received from Japan to the effect that full pressed bales were being opened in Bombay and after being fraudulently mixed with inferior cotton were repressed and exported to Japan. The East India Cotton Association, which had also received similar complaints, had replied

REPLY MADE BY THE ASSOCIATION

17. Complaints were also received from the International Federation of Muslim Cotton Spinners' and Manufacturers' Associations, Manchester, about the presence of foreign matter in Indian cotton. The Committee felt, however, that a general condemnation of the ginning of Indian cotton was not helpful towards a solution of the question and also that the complaints themselves were greatly exaggerated. The Federation were informed that the importance of exporting cotton for any complaint though actually very small in comparison with the opinion, Indian cotton was far more inferior than any other growths and as a result of better supervision the present position of foreign spinners reported the press marks and serial numbers of bales containing badly ginned cotton. Information was subsequently received that the reply of the Committee was fully discussed by the International Cotton Committee at its meeting in April 1928, and it was admitted that the Indian Central Cotton Committee was doing its best to eliminate the cause of spinners' complaints in East Indian cotton.

A complaint from one of the members of the Committee regarding the "Injab American cotton was reported who issued a circular to all owners them to take steps to avoid the recurrence of such complaints and to take necessary precautions to raise the standard of the ginning and pressing of cotton.

A reference from the Hyderabad State, regarding the presence of excessive seed in pressed bales of cotton, was forwarded for an expression of opinion to the East India Cotton Association who suggested in reply the installation in ginning factories of special sieves about four feet square, made either of haling hoops or expanded metal, whereby the cotton would be caught up and the seed which accidentally got mixed with the cotton would drop through the sieves. This suggestion was passed on to H E H the Nizam's Government.

As a result of reports received during the year that mill fly, droppings, cotton waste, and even old crop cotton were being mixed with good cotton in Khandesh, the matter was brought to the notice of the Bombay Government with the object of their taking steps under the Cotton Ginning and Pressing Factories (Bombay Amendment) Act, for the effective prevention of this malpractice. In their reply the Bomhay Government expressed their intention of awaiting the results of the propaganda work which the Agricultural Department was carrying on against the practice in question before taking action in the matter.

In connection with the mixing of cotton waste with good cotton, it was noticed that cotton waste was being brought to the Dhulia cotton market in increasing quantities and as most of it was used for mixing with good cotton, a reference on the subject was made to the Chairman of the Dhulia Cotton Market Committee. He reported that the entry of cotton waste into the market could not legally be prevented, since dealings in cotton waste were recognised under the Bomhay Cotton Markets Rules, he, however, considered that the only remedy for preventing the mixing of fly, mill dropping and cotton waste with good cotton was the application of the Cotton Ginning and Pressing Factories (Bomhay Amendment) Act, to the whole of the Khandesh tract and the amendment of the definition of "cotton" so as to exclude from it "cotton waste" and "mill droppings," which should be brought under the category of foreign substance.

The Committee at its meeting in August 1936 passed a resolution requesting the Government of Bombay to extend the Cotton Ginning and Pressing Factories (Bomhay Amendment) Act to East and West Khandesh, and other tracts of the Bomhay Presidency, particularly in view of the fact that the Central Provinces Government had already passed similar legislation. The resolution also drew the attention of the Government of Bomhay to the fact that the Bomhay Act as at present worded did not

prevent the mixing of cotton waste with cotton and requested them to take in hand the necessary amendment for this purpose

The presence of seed and impurities in full pressed bales from various places in the Punjab and the Patiala State continued to be the subject of complaints. The Director of Agriculture, Punjab, was requested to bring the complaints to the notice of factory owners concerned in the Province and to impress on them that such malpractices lowered the reputation of the cotton of the tract and adversely affected the interests of the trade and the cultivators. Action as suggested was accordingly taken. As regards the complaints from the Patiala State, the attention of the State authorities was drawn to the careless manner in which ginning was done and to the existence of admixtures of seed in Patiala cotton. Intimation was subsequently received to the effect that steps were being taken to put a stop to the malpractice complained of and that a warning had been issued to the factory owners.

At the suggestion of a cotton exporting firm in Karachi, the Karachi Cotton Association was addressed regarding the desirability of circularising during the coming season those cotton containing impurities who found indulging in malpractices. Cotton Association and also the the East India Cotton Association. The Karachi Cotton Association declined to address the factories concerned first in a friendly way and to await the result of the propaganda carried on before taking action on the lines suggested.

In the absence of legislation for the suppression of malpractices, a suggestion was made to the East India Cotton Association, that they should tackle the problem by imposing penalties and issuing if necessary, instructions to its surveyors and arbitrators to be more strict in their awards. In their reply the Association stated that the question of taking effective measures against watering would be considered by the Board after the results of tests on the moisture content of cotton become available. As regards false packing, the Association had under consideration the question whether cotton containing excessive seed and/or crushed seed should be rejected by the award of sufficient 'off' allowances irrespective of other characteristics of the cotton.

COTTON MARKETS

17. In the Bombay Presidency, a cotton market was established at Dburgha in 1930, another at Amalner in 1934 and a third at Bailhongal in 1935. During the year under report no appreciable progress was made in the establishment of regulated cotton markets though Bombay Government expressed themselves as being in favour of establishing regulated cotton markets at Broach and Bijapur and at Bavla in the Ahmedabad District.

In the Central Provinces two regulated cotton markets have been in existence under their Act which was passed in 1932—one at Warora and another at Chanda. The reasons given for the non establishment of a larger number of regulated markets were (1) the apathy or active opposition of local bodies, in whose hands lay the initiative of applying for their establishment, for fear of losing power, (2) the reduction of the income from cotton markets owing to the failure of the cotton crop for four consecutive years and (3) the small volume of cotton marketed in some places which did not justify the formation of a separate market for cotton. The Central Provinces Legislative Council passed during the year under report a law empowering the Local Government to establish regulated cotton markets even without the consent of the local bodies concerned. It is hoped that this measure will lead to the more rapid establishment of regulated cotton markets. The Municipalities of Wardha and Hinganghat have already applied for the issue of the necessary notification making the Act applicable to the markets at those stations. The Local Government have under contemplation the application of the Central Provinces Act to Berar also and the repeal of the separate Act in force there.

In the Madras Presidency, there is only one regulated market—at Tiruppur in the Coimbatore District—established under the provisions of the Madras Commercial Crops Markets Act, 1933. During the year two amending Acts to the Madras Commercial Crops Markets Act were passed, the first of which empowers the Government to nominate all the members of Market Committees when a Market Committee is to be established for the first time. This ensures that no time is lost in connection with the elections before a Market Committee is brought into existence. The original Act required that out of the twelve members constituting the Market Committee, two should be nominated by Government and the rest elected. This amendment further confers on the Local Government the power to alter the limits of the notified area. The second amendment makes it obligatory on all ginning and pressing factory owners to take out licenses to enable them to carry on their business for the sale and purchase of cotton. This Act further provides for dealing with the continued absence of members of Market Committees.

The Punjab Government are for the present not in favour of the establishment of regulated cotton markets.

In Sangli State the original Huzur Order regulating the sale and purchase of commercial crops in the State continued to be in force.

In the Baroda State, the framing of rules under the Baroda Agricultural Produce Markets Act, referred to in previous reports, is still under contemplation.

In Hyderabad State there are several cotton markets to which the Hyderabad Agricultural Markets Act has been applied.

UNIVERSAL STANDARDS FOR INDIAN COTTONS IN INDIA

18 In accordance with the Committee's decision the Standards Sub Committee passed during the year under report the universal standards in India for the following varieties of cotton —

<i>Bengals</i>	<i>Sind American</i>	<i>Mathias.</i>
<i>Sind</i>	<i>Kumtas</i>	<i>Broach</i>
<i>Punjab American</i>	<i>Oomras</i>	<i>Dholleras</i>

The reference standards of the Committee were stored at Bangalore in hermetically sealed zinc cases and on being compared at the time of the preparation of the current season's
 at Sewri in the ordinary way, they
 better in colour. The Standards S
 in future the Sewri sets also should
 cases with a view to finding out to
 attributable to difference in climate.

It might perhaps not be without interest to record here the reasons which led the Committee to move in the direction of establishing universal standards for Indian cotton and the extent to which its objective has been accomplished. Prior to 1933 there were two separate bodies in India which prepared standards for Indian cotton, viz., the East India Cotton Association and the Karachi Cotton Association. The latter Association prepared standards for *Bengals*, *Sind*, *Punjab American* and *Sind American* cottons only whilst the former had, in addition to standards for the first three varieties of the cottons mentioned, standards for other varieties of Indian cotton also. It was observed that the standards of the cottons dealt with by the two Associations differed from each other and as thus resulted in certain amount of competition between the two markets which was likely to be detrimental to the interests of the cotton trade as a whole, it was considered desirable to adopt standards which would be of universal application throughout the country. It was also felt that the Indian Central Cotton Committee was the body best fitted to take the initiative in this matter and as a result of the Committee's intervention standards common both to the Bombay and Karachi cotton markets were prepared for the first time in 1934. Whilst it is too early to expect any appreciable trading in these Universal standards, it is noteworthy that the Karachi Cotton Association have decided to accept the Universal Standards of the Committee as the basis for the Karachi standards, and that the Standards Committee of the East India Cotton Association have recommended to the Board of Directors of the Association that the Universal Standards should be adopted as the basis for the preparation of the official standards of the Association. Thus in respect of the varieties of cotton dealt with by both the Associations, the standards for them will be common in all but name.

REPRESENTATION ON THE INTERNATIONAL FEDERATION OF
MASTER COTTON SPINNERS' AND MANUFACTURERS'
ASSOCIATIONS

19 Mention was made in last year's report that in order to deal more effectively with complaints arising abroad regarding faults, often of a minor nature, in Indian cotton which frequently received wide publicity through the publication of the proceedings of the bodies at which they were discussed, the Committee considered it desirable to obtain, if possible, representation on the International Federation of Master Cotton Spinners' and Manufacturers' Associations, Manchester. The Committee has since been admitted as an Associate Member of the Associations and this will ensure the proper presentation of the position in India, both by the Committee or its duly appointed representatives, whenever cases relating to Indian cotton come up for discussion at meetings of the Federation.

THE UNITED PROVINCES COTTON PEST CONTROL BILL

20 The cotton crop of the United Provinces is subject to attack by the Pink Bollworm and it is calculated that upwards of 25 per cent of the crop of this province in normal years and nearly 50 per cent in some years is destroyed by this insect pest. The normal loss to the cultivator is estimated at Re 10 to Rs 15 per acre. As a result of continued research between 1923 and 1931 financed by the Committee, it has been ascertained that the treatment of all cotton seed by heating to an appropriate temperature kills the hibernating larvae and diminishes the attacks of this pest with consequent increase in yield and income. To reduce its depredations the United Provinces Government have accordingly introduced in the local legislature the United Provinces Cotton Pest Control Bill,* which provides for all cotton seed in the notified area to be subjected to heat treatment before being sown. With the passing of this piece of legislation, the cultivators within the sphere of its operation will reap the higher profits which the new treatment is shown to be capable of as a result of the heat treatment.

future progress viz., the growing of long staple cotton in the United Provinces.

MEANS TO PREVENT THE INTRODUCTION OF FOREIGN COTTON PESTS

21 The Mexican Boll weevil (*Anthonomus grandis*)—The restrictions placed by the Government of India in 1925 on the import of American cotton into India with a view to prevent the introduction of the Mexican Boll weevil continued in force, without change, during the year under review. Under these regulations American cotton can be imported into

* The Bill has since been passed into Law (Appendix VIID).

India only through the port of Bombay and after fumigation with hydro cyanic acid gas on payment of the prescribed fees. Imports of American cotton declined to 21,121 bales during the year from 63,171 bales in the preceding year. During the year the Government of India at the request of the Committee made permanent the reduced fees of Rs 2 7 per square bale and of Re 1 8 per round bale of American cotton.

*The Red (Sudan) Boll worm (*Diparopsis castanea*) and other pests—*
The entire prohibition of the import of foreign kapas (unginned cotton) under Government of India Notification No 897 Agri., dated the 24th July 1925, and the restrictions placed on the import of foreign cotton seed under Notification No 1213 Agri., dated the 27th May 1930, of the Government of India in the Department of Education, Health and Lands remained in force throughout the year. Under the 1930 Notification 10 parcels of cotton seed were received, examined, and where necessary, fumigated, during the year.

COLLECTION AND SUPPLY OF INFORMATION

22 As usual, notes* on the progress in the Provinces and Indian States in the introduction of improved varieties of cotton and on the work of the Committee were supplied to the East India Cotton Association and the Karachi Cotton Association for publication. The weekly statements of purchases and arrivals of American cotton were published as usual for general information. The names of ginning and pressing factories in Indian States with the requisite details regarding press marks, name of owner or occupier, etc., were obtained and communicated to the Director General of Commercial Intelligence and Statistics Calcutta for publication in the *Indian Trade Journal* and for incorporation in the list of Cotton Ginning and Pressing Factories published by that Department.

PUBLICITY AND PROPAGANDA

23 The Annual Report of the Publicity Officer, which forms Chapter VII of this Report, gives a full account of the activities of the Publicity and Propaganda Department of the Committee.

The most important event of the year was the drive initiated by the Bombay Department of Agriculture, with the Committee's co-operation to eliminate the inferior type of cotton known as *Goghar* from the Surat tract. The anti *Goghar* poster 'Get rid of the weight,' placards, etc., were used with much advantage during the campaign. Only partial success, however, attended these efforts as owing to its higher ginning percentage, *Goghar* was mixed with Surat 1027A L F and the mixture was passed off as genuine *Nawari*. In order to put a stop to this malpractice, legislation

* Appendix IX

was introduced in the Bombay Council and passed* prohibiting in any notified area the cultivation of *Goghari* cotton, its mixture with any other cotton and the possession, use or trade in such cotton either alone or mixed with other cotton.

Fifteen press *communiqués* were issued, two of which dealt with the development of cotton growing in Sind and the Bombay Presidency and one with the improvement of cotton in India.

Besides the special articles and pamphlets issued from time to time the Department also participated in the Rural Life Exhibition at Baroda, organised in celebration of the Diamond Jubilee of H H the Maharaja of Baroda, the All India Industrial Exhibition, Delhi, the Fair in Rajputana, the Crop Demonstration at Amraoti and Yeotmal and the Fair and Demonstration at Warora in the Central Provinces.

PUBLICATIONS

24 The Committee receives partly by subscription and partly on an exchange basis a number of important scientific and technical journals which are circulated to research workers under the Committee. This arrangement not only effects economy but also affords to the Committee's research workers an opportunity of perusing varied and up to date scientific literature which otherwise would not ordinarily be available to them.

The Committee desires to express its indebtedness to those institutions on whose free mailing list its name has been placed. Particular mention may be made of the British Cotton Industry Research Association for its Summary of Current Literature and the Shirley Institute Memoirs, the

Committee has also to record its thanks to the Indian Trade Commissioner, London, the U.S.A. Department of Agriculture, the Egyptian Ministry of Agriculture, Technical and Scientific Service, the Liverpool Cotton Association, the Lancashire Indian Cotton Committee, the Imperial Bureau of Plant Genetics, Cambridge, the Textile Institute, Manchester, the Imperial Institute, London, the Indian Statistical Institute, Calcutta, the National Institute of Sciences, Calcutta, the Academy of Sciences and other Associations and Chambers of Commerce for supplying it with reports, statistics and other literature from time to time. The Committee is also on the free exchange list of the Imperial Council of Agricultural Research, the Imperial Institute of Agricultural Research, Delhi, and the Director General of Commercial Intelligence and Statistics, Calcutta.

* Appendix V.

SECRETARY'S TOURS

25 The places visited by Secretary between the 1st September 1935 and the 31st August 1936, in connection with the work of the Committee were —

Mirpurkhas, Oderolal, Sakrand, Salkur, Lloyd Barrage, Almani Johi and Dadu in Sind, Parbhani, Nandapur, Nanded, Latur, Chikurda, Ardhapur, Hadgaon, Basar and Madhol in the Hyderabad State, Coimbatore, Perundurai, Tiruppur and Ootacamund in the Madras Presidency and Indore and Delhi

FINANCIAL

26 In Appendix X will be found a statement showing the Receipts and Expenditure of the Committee and also the Balance Sheet for the year ending 31st March 1936 Receipts amounted to Rs 10,12,740, and expenditure to Rs 11,40,629

With the separation of Burma from India under the new constitution, the cess hitherto collected from that Province will no more be available to the Committee, this loss, however, will to some extent be compensated for the fact that the Committee will not be called upon to sponsor cotton schemes in that Province after separation

CHAPTER III.

STATISTICS

27 Cotton being one of the principal money crops of the Indian agriculturist and cotton manufacture one of the most important industries of the country, it is inevitable that the Committee should devote much of its attention to the improvement, preparation and publication of cotton statistics. The following paragraphs deal with the work done under this head during the year

28 *Cotton Crop Estimates*—As usual cotton crop estimates were wired by the Director General of Commercial Intelligence and Statistics, Calcutta, to the Secretary, Indian Central Cotton Committee with a view to their simultaneous publication at Bomhay and Calcutta. This arrangement has now been in force for the last six years and from the trade point of view its institution has been amply justified

A comparison with the previous year's figures shows that the area under cotton in India increased from 24,023,000 to 25,138,000 acres, the highest since 1929-30 when it was 25,922,000 acres. The firm price level for cotton in the preceding year coupled with the comparatively favourable sowing conditions in the cotton growing tracts partly contributed to the increased acreage. The total estimated yield for 1935-36 was 5,728,000 hales of 400 lbs each, as against 4,858,000 hales for 1934-35, the yield being nearly as high as that in 1928-29 when it touched 5,782,000 hales of 400 lbs each. Favourable weather conditions during the season under report were responsible for the improvement in the average yield per acre which was 91 lbs in 1935-36, against 81 lbs in the preceding year, the highest average in the last decade being 96 in the year 1927-28.

The fillip to cotton cultivation in India given by the opening of the Sukkur Barrage and Canal systems in 1932 is demonstrated by the fact

under long and medium staple American strains

29 *Improvement of the problem of improving taken by the Committee*
provement of the cotton forecasts of the Bombay Presidency and Sind (including Indian States), for two years at an estimated cost of Rs 11,694. The object of the scheme, which incidentally embraces roughly one fourth of the area under cotton in India, is to probe into the sources of the in

was extended by three years up to 15th June 1939, at an additional cost of Rs 16,500. During the year under report a recurring error which was rectified was found to be the adoption in the forecast estimates of several Indian States in the Bombay Presidency of a standard for a normal crop

in vogue in British India. Further, for some Indian States, those for sown and this procedure was found ton forecasts of some of the States

With a view therefore to formulate independent standard yield figures to replace those now used efforts were made to obtain actual yield figures and over a series of years. As regards nimation of the available statistics narato standard yield figures for cotton in irrigated and non irrigated areas, and it is accordingly proposed to prepare the forecasts of 1936 37, on this basis

One of the factors adversely affecting the accuracy of Government cotton forecasts in India is the lack of exact information regarding the quantity of kapas (seed cotton) and loose (ginned but unpressed) cotton which is consumed chiefly in villages for such domestic purposes as hand spinning, making of quilts, mattresses, cordage, etc. Such extra factory consumption is roughly estimated at 750,000 hales for the whole of India. To arrive at a more reliable estimate of the extra factory consumption, local enquiries were conducted in typical localities in different provinces and States with the aid of funds provided by the Indian Central Cotton Committee. Until all the reports are received and considered it is too early to say whether any alteration in the conventional estimate of 750,000 hales for extra factory consumption can be recommended or whether further investigations will be necessary before a final decision is arrived at.

As a result of the *post mortem* examination of the cotton forecasts of each season, the subject of the improvement of the cotton forecast is engaging the close attention of the authorities concerned to whom a forum for the exchange of views and discussion of common problems is afforded by the half yearly meetings of the Cotton Forecast Improvement Sub Committee. As a result of the critical examination of the sources of error in the cotton forecasts of past seasons tentative revised standard yield figures have been adopted for Sind and for parts of the Bombay Presidency. Crop cutting experiments now under way in the British districts of the Punjab on a more extensive scale than before will, it is hoped, provide a more reliable basis for fixing the standard yield figures, while the institution in the Central Provinces and Berar of weekly ginning returns with effect from the season of 1935 36 has brought the problem of improving the accuracy of the cotton forecasts of that province nearer solution. In view of the under estimation noticed in the cotton forecasts of the Mysore State in the past seasons proposals for conducting crop cutting experiments during 1936 37 to arrive at more accurate standard yield figures are under consideration by the State.

30 Staple Length of the Indian Cotton Crop—As usual a report on the estimated production during the season of Indian cotton of different staple lengths was issued in May. At the suggestion of the trade, which was accepted by the Committee, trade estimates were for the first time in this respect shown side by side with Government estimates. Whilst it is realised that the reconciliation of the Government with the trade estimates is not unattended with difficulty as the basis under which the two estimates are prepared are dissimilar, its bearing on the problem of the accuracy of the Government cotton forecasts warrants its examination. The Committee warmly acknowledges the assistance which it has received from the trade in this connection.

31 Press Statistics—Since 1925, weekly returns of cotton pressed in British India have been collated by Provincial authorities under the Indian Cotton Ginning and Pressing Factories Act, 1925 and forwarded to the Director General of Commercial Intelligence and Statistics for publication. To make the statistics of cotton pressed complete for the whole of India, the co-operation of Indian States was enlisted and it seven States addressed have responded. In the previous year a report that press returns for the Gwabor State would be available from 1935-36 has unfortunately not materialised owing to certain administrative difficulties, which, however, have since been overcome and it is hoped that the returns will be available from the 1936-37 season.

During the season 1935-36 4,321,364 bales were pressed in British India and 1,623,169 bales in Indian States making a total of 5,944,533 bales for the whole of India, the corresponding figures for the preceding season being 3,414,875, 1,166,938 and 4,611,813 bales, respectively.

32 Loose (Unpressed) Cotton Statistics—The statistics of cotton pressed referred to in the preceding paragraph do not account for the whole of the Indian cotton crop, as, besides the cotton utilised for village or extra factory consumption chiefly in the form of *kapas* for which as explained elsewhere efforts are being made to obtain a more reliable estimate, mills situated in the heart of cotton growing areas use considerable quantities of loose (ginned but unpressed) cotton. To account for this, the statistics of loose cotton received at mills in the major cotton growing provinces have therefore been obtained on a voluntary basis since 1926 and published. In 1935-36, 264,000 bales of loose cotton were received at mills in the major cotton growing provinces of British India. The relevant figures for 1926-27 to 1935-36 are shown in Appendix VI to this report.

During the year under report, the Government of India, on the recommendation of the Committee, amended the form of monthly returns required to be submitted by mills under the Indian Cotton Cess Act, as a result of which the quantities of pressed and unpressed cotton consumed

in mills have now to be shown separately in the prescribed returns. The Indian States concerned have also extended their co-operation by instructing the mills within their jurisdiction to furnish the information supplied voluntarily by them classified in a similar manner. The figures for unpressed cotton consumed in mills collected largely under statute will now ensure the publication of more accurate and complete information for the whole of India.

33 Consumption — As in the past, figures for the consumption of Indian cotton in mills in British India and Indian States were published monthly. The season's total consumption of Indian cotton in mills in India amounted to 2,677,572 bales of 400 lbs net and established a new record, breaking the previous year's record figure of 2,612,132 bales (vide Appendix XI). Compared with last year, the consumption of cotton in the Bombay Presidency showed a decline whilst Indian States, the United Provinces, the Central Provinces and the Madras Presidency all registered increases.

According to the figures published by the International Federation of Master Cotton Spinners' and Manufacturers' Associations, the world's total mill consumption of Indian cotton, exclusive of Germany and Italy (for which figures are not available), showed a slight decrease from 5,414,000 bales during the year ending 31st July 1933 to 5,393,000 bales during the corresponding period of 1935-36.

34 Exports — The exports of Indian cotton during the season totalled 3,820,000 bales of 400 lbs each against 3,115,000 bales in the previous year.

35 Stocks — Up to 1933 reliable estimates of the stocks of Indian cotton held in mills and at trade centres in India on 31st August were not available except for the Island of Bombay. In view of the value of these figures to the trade as well as to the authorities in the Provinces and States responsible for preparing and checking the cotton forecasts, the Committee has been endeavouring since 1933 to collect the desired information on a voluntary basis through the co-operation of mills, trade associations, Cotton Market Committees and other official sources. Though the problem is not an easy one due to its wide ramifications, considerable headway has been made, and in course of time with an increasing realisation of the usefulness of these statistics, it is hoped, accurate and complete figures will become available.

The information collected in respect of the stocks held on the 31st August 1936, is contained in Appendix XII.

As regards the very late crops, i.e., Sileris, Corchorus and Tinne yellies of the Madras Presidency, the season for which is taken to be the year ending 31st January, the Director of Agriculture, Madras, has made

stocks held on 31st January, by the mills in the whole of the Presidency and 1936 are given in Appendix XII.

statistics of the export cotton are of considerable interest and shaping the cotton policy of India and the Committee has, therefore, for some time past, been collecting the relevant data through direct enquiries on a voluntary basis. Further, to enable the grower to realise the best value for his cotton, it is essential that he should grow those types for which the demand is keen and these statistics therefore serve as a guide to him. The tables in Statistical Leaflets Nos 3 and 4, Third Issues (1935-36), giving the results of the inquiry carried out in respect of exports and receipts at mills during 1935-36, are reproduced in Appendices XIII and XIV.

37 *Publications*—The undermentioned publications were issued during the year under report —

- (1) *Statistical Leaflet No. 1*, Third Issue (1935-36), "Report on the Staple Length of the Indian Cotton Crop of 1935-36 season"
- (2) *Statistical Leaflet No. 2*, Second Issue (1934-35), "Stocks of Indian raw cotton held in India by the mills and the trade on 31st August 1935"
- (3) *Statistical Leaflet No. 3*, Second Issue (1935-36), "Receipts at mills in India of raw cotton classified by varieties—1934-35 season"
- (4) *Statistical Leaflet No. 4*, Second Issue (1934-35), "Export by sea of Indian raw cotton classified by varieties—1934-35 season"

CHAPTER IV.

RESEARCH

38 THE Indian Central Cotton Committee carries out its research policy by direct control of the Technological Laboratory at Matunga, Bombay, and by granting subsidies to Departments of Agriculture in provinces and States for the investigation of cotton problems mainly of an all India importance or for large areas where cotton is an important crop. In addition the Committee contributes a large sum of money for the maintenance of the Institute of Plant Industry, Indore, where problems of fundamental, economic and agricultural importance are under investigation. The problems of research in provinces and States include, as explained in previous years, several schemes—botanical for breeding high yielding superior types of cotton, entomological for the study of the life history of certain cotton pests and finding out measures to combat them, mycological for ascertaining ways and means to prevent loss due to wilt and root rot and

report there were in all twenty nine research schemes and seventeen seed
operation, the total amount sanctioned a further sum of Rs 3,91,663 4 10
oratory, Matunga the Institute of
omic inquiry into the cost of cotton,
sugarcane and their rotation crops. The Committee also offers scholarships
and training grants for post graduate training in India and abroad in
subjects connected with cotton industry. All schemes, scholarships and
training grants are first thoroughly examined and approved by the Agricultural
Research Sub Committee and the Technological Research Sub Committee
before they are finally sanctioned by the full Committee. It is also the function of these two Sub Committees to examine the annual
reports and keep the Committee in touch with the progress of each scheme

TECHNOLOGICAL LABORATORY.

39 Details of the work carried out at the Technological Laboratory during the year will be found in the report of the Director which forms Chapter VI of this report. Whilst the resources of the Laboratory continued to be

availed of as in the past by agricultural officers in assessing the spinning value of their new strains, mills utilised to a much greater extent than in the past the facilities afforded by the Laboratory for the testing of their samples or the solution of their problems. The number of samples, lots and yarns spun in the Spinning Laboratory during the year under report recorded an increase of 24, 20 and 0.5 per cent respectively over the figures for the previous year. Samples are tested at the Laboratory under the following groups—
 (a) cottons, (b) trade samples represent

cultural Departments and also some old types grown in connection with certain field experiments. The number of samples tested under this head was 330 against 251 in the preceding year. (c) The standard cottons mostly represent the improved varieties which now cover about 15 per cent of the total area under cotton cultivation in India and they at present include the following ten varieties—*Punjab American* 289F, *Verum* 262 (Nagpur), *Verum* 262 (Akola), V 434 (Akola), *Late Verum* (Nagpur), *Umri Bani*,

average quality of different varieties of Indian cotton which form the bulk of the cotton crop, and (d) those supplied under arrangement with the Bombay and Ahmedabad Millowners' Associations and which represent the early arrivals of the various Indian cottons into the local markets. Altogether 18 samples of the first category and 22 of the second were tested during the year and the results were published in 2 or 3 page circulars which were widely distributed to the trade and industry both in this country and abroad. A new feature introduced during the year was the compilation of all those circulars in the form of a bulletin for ready reference which was published for the first time.

Varieties of Indian Cotton

In addition to these

in their private capacity were also tested, as in the past, on payment of the fees prescribed by the Indian Central Cotton Committee. The number of such samples tested and reported upon during the year was 127 as compared with 39 in the previous year, this increase would seem to justify the conclusion that the practical value of the Laboratory is being gradually realised by the trade. Other samples of cotton, mostly from the trade completed during the year were tested to determine the effect of compression on the spinning quality of cotton. The results of these tests will be found in the report on the spinning quality of cotton and the deterioration of cotton stored in the open and in sheds at Karachi. (d) Technological samples comprise those samples of cotton tested at the Laboratory in connection with certain research problems. A brief account of some of these will be found in the Director's report. Side by side with the work of the Spinning Laboratory, problems are being investigated in the Research Section of the Laboratory, details of which are also given in the report of the Director.

The Moisture Testing Section carried out tests on 24 samples received during the period under review, 2 of which were on behalf of the Appeal Committee of the East India Cotton Association and 11 for the trade; the remaining 11 were in connection with Laboratory investigations.

INSTITUTE OF PLANT INDUSTRY, INDORE.

40. The Annual Progress Report for the year ended 30th June 1936 of the Director, Institute of Plant Industry, Indore, with the exception of Section 10 which deals with crops other than cotton, is reproduced in Appendix IV of this report. The Institute which was established in 1924 with the object of providing a central research station for cotton in the black soil area of the Malwa plateau is maintained by annual contributions from the Indian Central Cotton Committee and the member States in Central India and Rajputana. Although the interests of the Committee are confined mainly to cotton and those of the two States to specific crop problems of their own and the dissemination of more efficient agricultural practices, the interests of both parties are complementary and are harmoniously balanced in the work of the Institute. The Committee and the member States are represented on the Governing Body of the Institute in proportion to the grants made by them, in the financial year 1935-36, the Committee's contributions to the Institute amounted to Rs 97,600 against Rs 67,335 of the member States. On this basis, the Committee is at present represented by nine members on the Governing Body against 5 representatives of the States.

GRANTS-IN-AID.

SCHEMES IN PROGRESS IN PROVINCES AND STATES

MADRAS PRESIDENCY.

41. The *Herbaceum Scheme* is one of the oldest schemes which commenced in 1923. Its original object was to obtain from local *Uppam* (*G. herbaceum*) suitable types to replace *Karunganni* (*G. indicum*) in 'Salems' and 'Tinnevelly' tracts where rainfall is low and uncertain. In years of good rainfall *Karunganni* gives a much higher yield than *Uppam* but in bad years the position is reversed, *Uppam* being a hardier variety capable of giving a fair yield even under adverse climatic conditions. The cultivator meets the situation by growing a mixture of the two cottons. The *Karunganni* strains which are now being distributed by the Agricultural Department upto 26's warp counts against 14's of the scheme therefore was to produce *Uppam* which could spin at least upto

20's It was, however, realised after 7 years' work that the chances of obtaining pure strains from *Uppam* that would come up to the standard were few and the Committee therefore extended the scheme in 1930 for a further period of five years for securing by hybridisation what was not possible by unit selections.

The new line of work has already produced promising results. Of the two hybrid strains, 4803 and 4714, reported last year as promising, the latter has once again proved very satisfactory and that also in one of the most droughty and trying years experienced within the past two decades. In yield it has proved superior to Karungannai strains and it is capable of spinning upto 27's standard warp. It is also satisfactory from the point of ginning outturn, drought resistance and ability to withstand untimely February rains, common to 'Salems' and 'Tinnevelly' tracts. It has, however, the disadvantage of being a narrow lohed variety which is likely to be mistaken for *G. roseum*. Attempts are being made to isolate broad-lohed mutants which reoccur every year in this strain.

The work on purification of selections from other crosses was continued as usual.

42 *Pemphères and Physiological Scheme*—This scheme seriously commenced work only in February 1935, though the preliminary investigations were started in 1931 pending the return of the two officers deputed for special training in England in plant physiology and biochemistry before they were appointed as Physiological Botanist and Bio chemist respectively under the scheme. The principal object of the scheme is, as finally decided by the Committee in January 1935, to minimise by breeding and physiological methods bud, flower and boll shedding in *Karunganni* (*G. indicum*) caused by untimely rains and to devise control measures against the cotton stem borer, (*Pemphères affinis*), a serious pest in all Tamil districts (Tinne vellos, Salems and Cambodia tracts) and to some extent in the Vizagapatam district. The incidence of the pest varies in inverse proportion to the length of the close period between two cotton crops and also cottons grown under drier conditions seem to suffer less than those receiving irrigation or inter-

our species of parasites, a
during the survey of the
or and no parasite has so
far been observed on the egg, pupa and adult stages. The four parasites
put together do not seem to account for more than 5 per cent. of the mortal-
ity of the larvae but under favourable conditions this Braconid parasite
may give better results.

The work of the year on botanical research shows that of the large number of varieties of cotton tested, only four, viz., *Quebradinho*, *Verdaro*, *Moco* and *Bourbon*, suffered low mortality from the pest. Local varieties, harring *Nadam*, suffered more than *Co 2* (Cambodia) when they were grown under similar conditions and their comparative freedom from the pest is

probably due to local rotations and late sowing. The most interesting feature of this year's observations is that *Quebradinho*, *Verdavo* and *Moco* produced gum more readily in the attacked parts killing the larvae before they reached adult stage and emerged out of the plants. They are, however, late in maturing and poor in yield compared with *Co 2*, but they may prove useful for breeding tolerant types.

The biochemical investigation shows that the gum formation in the attacked plants is due to the bacterial activity and is associated with the carbohydrate make up of the plant. It has been further ascertained that the three varieties of cotton which produce gum readily are richer in water soluble polysaccharides in early stages of growth than the varieties that do not readily produce gums while the reverse is the case in the later stages. If these findings are confirmed the breeding work may become easier and more precise.

41. *ML₆ Nodules* (*C. a. D.*)

satisfactorily. *Nadam* being a perennial cotton serves as a breeding ground for *G. herbaceum*) grows

the stem weevil and pink boll-worm during the close period of *Cambodia* prescribed by the Madras Pest Act, and if an annual variety suitable for light soils of the two districts is secured it will be possible to extend the Pest Act to the whole of *Cambodia* tract without exception and thus avoid damage to *Cambodia* cotton.

The work of the year under report gives again an indication of the possibility of securing suitable annual types which could replace *Nadam*. A large number of selections from *Co 2* (*Cambodia*) and *Nadam* and crosses between *Co 2* and *Bourbon*, *Co 2* and South African cottons, *Bourbon* and South African cottons, *Nadam* and *Karunganni* and *Nadam* and *Karunganni* back crossed with *Karunganni* were tested and the results obtained from some of the crosses between *Co 2* and *U 4* (South African) and *Co 2* and *U 4* (South African) and *Co 2* and *Karunganni* were as follows:

all plots	60 lbs
60 lbs	rd year

from *Nadam* *Cambodia* also gave good results when it was given a spacing of 18' x 9'

BOMBAY PRESIDENCY

45 *The Broach Cotton Breeding Scheme*, which has now completed its fourth year, has for its object the breeding of suitable types of cotton for the

high ginning outturn. Of the eight *F₁* to *F₅* crosses critically studied

were also fairly uniform for economic characters such as yield, ginning outturn, staple length and fineness of fibre. All these cultures will be further tested on a large scale next year for purity of characters. Most of the crosses examined last year were re-crossed with *B D 8*, one of their parents, with a view to increasing rapidly homozygosity for high wilt resistance and spinning qualities.

Of the single line selections *N S 12* maintained again its previous record of wilt resistance and other economic characters.

46 *Jalgaon Cotton Breeding Scheme*—This scheme, like the above, commenced in April 1932, with a view to secure by unit selection or hybridisation suitable wilt resistant types with heavy yielding high ginning and good spinning qualities to replace local *N R* and *Banilla* in Khandesh. *Banilla* is superior to local *N R* in ginning outturn and spinning characters and gives better return to the cultivator. It is, however, susceptible to wilt and has also deteriorated in spinning quality since it was first introduced.

The three selections, *N V 57 7*, *N V 56 3* and *N V 56 17*, which were reported as promising last year, have maintained again this year their superiority almost in every respect over *Banilla*, *N R 6* and local *N.R*. Of the three new selections, *N V 56 3* is better drought resistant and more vigorous in growth and also gives higher ginning outturn than *N V 57 7*, the next best. It spins up to 40's against 41's of *N V 57 7* and 35's of *N V 56 17*. The highest spinning capacity of *Banilla* varies from 10's to 15's while *N R* spins only upto 7's.

Many other new promising selections are under severe tests for wilt resistance.

47 *The Scheme for Survey of Goghar Cotton in Gujarat* is the outcome of the Committee's policy to establish 1027 A L F to the exclusion of all other varieties of cotton in the tract lying south of the Nerbudda. A seed scheme was accordingly started in 1934 for rapid expansion of 1027 A L F. Subsequent experience, however, revealed that to achieve the Committee's object within a reasonable time it was necessary to start a campaign against *Goghar*, an inferior short staple variety which was favoured by ginners because of its high ginning percentage. A separate scheme for the survey of *Goghar* cotton was therefore started in January 1935 with a view to trace this cotton to gineries and induce their owners to discourage its cultivation by refusing to pay high prices for it. During the year under report 93 villages were surveyed in Jalalpore, Bardoli and Ankleshwar talukas and the results show that due to the active propaganda during the past two years there was a marked decrease of the area under *Goghar* this year except in a few villages in Ankleshwar taluka. The total area under *Goghar* and its mixture came down from 1,813 acres last year to 660 acres this year. The ginowners also were more reasonable than last year and co-operated with the Department of Agriculture by ginning pure and mixed *Goghar* separately and disposing of the seed in such a way as it would not be used for sowing.

Now that legislation has been passed by the Bomhay and Baroda Governments prohibiting the cultivation mixing or possession of *Goghar* cotton in Gujarat and that it has been brought to the notice of the cultivators by intensive propaganda, it is hoped that this cotton will completely disappear within the next one or two years.

48 *Plant Puller Propaganda Scheme in Surat and Broach Districts* — This scheme is the result of the Surat Boll worm Clean up Scheme sanctioned in 1930 for the purpose of bringing home to the cultivator in Gujarat the advantages of uprooting cotton stalks and stubbles before the end of May and thus depriving the punk and spotted boll worms of the food material till the next crop of cotton. The clean up scheme clearly demonstrated that by removing cotton stalks and stubbles in time the cultivator would obtain 25 to 30 per cent more yield and on the termination of the scheme in 1934

the Committee sanctioned the Plant Puller Propaganda Scheme, with a view to popularise the cotton plant puller, a cheap and effective implement for uprooting cotton plants.

During the year under report the propaganda work continued on the same lines as in previous years, viz., by means of public lectures, magic lantern shows and practical demonstrations. Due, however, to severe damage to the cotton crop by frost in January 1935, and to the action taken by some of the cultivators to grub the damaged crop with the local harrow, it was not possible to sell more than 739 plant pullers against 1,536 last year in Surat district and 2,271 against 3,441 in Broach district. The area uprooted was 56,000 acres or 20 per cent of the total area under cotton in Surat district and 143,296 acres or 62 per cent in Broach district.

49. *Scheme for Defibration of Cotton Seed*—The installation of the defibrating machine having been completed in January 1936, preliminary tests were commenced in the latter half of February. The quantity of seed treated was only 6,720 lbs., but the results indicate that defibration of local seed is not an economic proposition. The experiment will be repeated next year.

SIND.

50. *The Sind Physiological Scheme* was commenced in July 1927, with the object of ascertaining the optimum sowing time and irrigation and manurial requirements of cotton so that the Department of Agriculture might be in a position to advise the cultivator authoritatively on these points by the time the Sukkur Barrage was opened. In 1932 it was definitely concluded that March 15th to May 15th was the optimum sowing period for cotton under irrigated conditions in Sind and the investigation of the remaining two points, viz., the irrigation and manurial requirements of cotton, was continued. The work of the year under report is again a repetition of what was done during the past two years and the results obtained are once more in conformity with those of previous years. The irrigation experiments

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conditions

The manurial experiments have proved again that the application of manure to cotton is a profitable concern in Sind and that satisfactory returns can be expected when compost alone at the rate of 15 cart loads per acre before sowing or compost at the rate of 7½ cart loads per acre before sowing followed by ammonium sulphate at the rate of 50 to

100 lbs per acre 1½ months to 3½ months after sowing was applied. Best yields were obtained when the quantity of ammonium sulphate was increased to 200 lbs in addition to the basal application of compost.

PUNJAB.

51 *Botanical Scheme*—This scheme was started in 1925 with the object of enquiring into the causes of the periodic failures of *American* cotton in the Canal Colonies and obtaining suitable types of *American* and *Desi* cotton to replace the 4F and *Desi* cottons respectively. In view, however, of the immediate economic value of the improved types of cotton efforts are being concentrated on the problem of breeding and as will be seen below a separate physiological scheme has since been sanctioned for the investigation of the more difficult question of periodic failures of *American* cotton.

It was reported last year that after extensive trials under different conditions of soil and climate 43F, the best of the new *American* types, was finally selected for general distribution in place of 4F. During the year under report it again maintained its superiority over the three old types, 4F, 289F and LSS and gave satisfactory yields on an area of 6,000 acres under ordinary field conditions. It is expected to extend over 25,000 acres in 1936-37 season.

38F, another promising strain of *American* cotton, is gaining popularity in drier parts of the province where *jassid* is not a serious pest. It did well at Khasewal and also in Nabha State where in one *pargana* it is reported to have given a high average yield of 16 maunds per acre.

One other new strain of *American* cotton, 47F, which is still under final tests appears to be superior even to 43F in respect of yield, ginning out turn and hardness and is capable of spinning upto 50's standard warp counts.

Of the *Desi* varieties, 39M, which was also issued last year for distribution to the cultivators, is reported to have given during the year satisfactory yields everywhere it was grown on commercial scale. A large number of pure line and hybrid strains are under final tests.

52 *The Physiological Scheme*, as mentioned above, has for its object the investigation into the causes of the periodic partial failure of the *American* cotton in the Punjab and it commenced work in March 1935. This failure was in the past attributed to heat stroke, unfavourable combination of climatic and soil factors, white fly and *jassid* attack and concentration of salts in the feeding zones of the roots, though none of these theories was supported by scientific data. The first symptoms of the complaint were the reddening and bronzing of the leaves at the reproductive stage and as

similar symptoms in other crops had been shown by various workers to be due to nutritional disorders, the present investigation was commenced with manurial tests with magnesium, manganese and iron salts which gave no significant results. The next line of attack, i.e., the study of the internal structure of the plant, has given some striking results, revealing certain abnormalities in the leaf, stem and root which are probably responsible for defective boll-opening. In the case of the leaf " med up as accumulation of starch which is of the chloroplasts, the production of exce in the later stages the reddening of leaf due to the presence of anthocyanin pigments. In the root the first symptoms of abnormality is the brownian movement of very small particles, which aggregate in cells and form colonies covered with yellow mucilaginous mass. Later on these masses darken in colour and increase in numbers. They are situated in the cortical region and in the phloem. Another change which takes place in the root cells is the formation of deposits in the cortex and the phloem which appear to be protein precipitates. Ultimately the whole of the tissue of the bark becomes filled with these deposits which extend into the medullary rays and the xylem parenchyma. The conducting channels for the translocation of plastic material are thus filled with the precipitates of proteins, fats and tannins. Similar symptoms appear in the stem also.

53 Pink and Spotted Boll worm Scheme—In 1926 the Committee sanctioned a Pink Boll worm Scheme with the object of ascertaining the causes responsible for the difference in the incidence of the pink boll worm between the Canal Colonies where it is practically absent and the South East Punjab, where its attack on cotton is severe. The Pink Boll worm Scheme came to an end in 1934 when it was replaced by the present combined scheme, i.e., the Pink and Spotted Boll worm Scheme, for the continuation of the work on the pink boll worm and the investigation of certain economic aspects of the spotted boll worm. The results of the Pink Boll worm Scheme have been given in previous reports wherein it has been explained that the unequal distribution of the insect is mainly due to the difference in temperature and humidity between different areas. The study of the spotted boll worm pest during the year under report shows that unlike the pink bell worm pest it is more severe at Lyallpur and Multan, representative of Canal Colonies and Western Punjab than elsewhere. The loss due to the pest this year is estimated from the results of the night cage experiments at 26 per cent in Desi (local cotton) and 10 per cent in 4F (American variety) against 65 per cent and 47 per cent respectively last year.

It was mentioned in the last year's report that in the Punjab cotton sprouts from the previous year's stumps were the only source of food supply to the spotted boll worm for about six weeks from the middle of April. Further survey of food plants during the year under report shows that while this observation holds good so far as the Canal Colonies are concerned, the

same cannot be said of the south eastern, central and sub montane regions where in addition to cotton sprouts other host plants, particularly *Malva parviflora*, *Abutilon indicum* and *Malvestrum tricuspidatum* serve as breeding ground in the off season. It is thus evident that any clean up scheme for uprooting cotton stalks and stubbles to avoid the boll worm pest is not likely to yield satisfactory results unless the other host plants are simultaneously dealt with.

Of the three species of *Earias* (spotted boll worm), viz., *insulana*, *fabia* and *cupreoviridis* met with in the pests, the first being by far the common host plants so far known in the Punjab *esculentus* and rarely on other plants. *Insulana* and *fabia* remain active throughout the year while *cupreoviridis* hibernates in the form of pupa from October to April.

54 *The White Fly Scheme* was started in 1931 with a view to study the life history of the white fly (*Bemisia gossypiperda*), a small sucking insect that does damage to cotton and other crops and it came to an end in September 1936. The work of the year again confirms the results already obtained on the seasonal history of the pest. The most active period of the pest is from May to September and at the end of this period it migrates from cotton to alternative host plants like *Brassicaceae*, *Solanum tuberosum*, *Lycopersicum esculentum* and various weeds on which it passes winter. From March to May it extends to cultivated cowpeas and ratoon cotton and goes back thereafter to the new cotton crop on which it establishes itself once again. Infestation was found higher again this year on *Mollisonii* than on the *Punjab American* types and was reduced to some extent when ammonium sulphate was applied to the crop early in the season.

The chemical analysis of the affected and unaffected plants shows little difference in their nitrogen content till about the second week of July. Thereafter till the end of August the unaffected plants contain more nitrogen than the affected ones. The total quantity of nitrogen produced in a season in an unaffected plant amounts on an average to 1.20 grams against 0.95 grams in an infested plant and also the percentage of nitrogen transported from the vegetative to reproductive organs of the affected and uninfested plants is estimated at 12 and 20 respectively.

55 *Root Rot Scheme* — This scheme commenced in 1932 for the investigation of root rot in the Punjab, where, particularly in the canal irrigated areas, the annual damage done to cotton by this disease is estimated at Rs. 16 lakhs. Both Desi and American varieties are equally susceptible to this disease which makes its appearance towards the end of June when the crop is 6-8 weeks old and continues up to the middle of September. The disease is, however, practically harmless on any cotton grown under rainfed conditions.

and its activity seems to vary directly in proportion to the number of irrigations or the amount of moisture in the soil. It affects cotton and many leguminous crops but cereal crops like *Maize* (*Zea mays*), *Bajree* (*Pennisetum typhoideum*) and *Jowar* (*Andropogon sorghum*) are free from its effects though the causal organisms, *Rhizoctonia bataticola* and *Rhizoctonia solani* are present on their roots. The two organisms are carried over from year to year in live as well as decayed roots unlike the American root rot fungus (*Phymatotrichum omnivorum*) which lives only in live roots.

There is no type of cotton, *Desi* or American, in the Punjab at present which can resist the attack of root rot. Some of the plants of *Desi* and American types which appeared unaffected in a severely infested plot were selfed in 1934 and their progeny was tested in 1935. The results show that they were only escapes and not resistant to the disease. All the plants which looked again unaffected like their parents were selfed and such of them that had their roots free from the root rot organisms have been selected for further tests.

The physiological investigation of the two causal organisms give an indication that the application of ammonium salts might prove useful to minimise the disease but the results require further confirmation. Some interesting results have also been obtained from the study on the effect of temperature and hydrocyanic acid gas on sclerotia.

CENTRAL PROVINCES

56 Botanical Scheme — This is one of the Committee's earliest schemes sanctioned in 1923 for the purpose of obtaining wilt resistant, high yielding and fine spinning types of cotton suitable for the Central Provinces and Berar. This scheme, unlike other schemes, had the advantage of the cotton selection work already started by the Agricultural Department before it was sanctioned and it was therefore possible to obtain very soon a new type *Verum* 262 which looked at the time satisfactory from every point of view. It was, however, soon realised that this type, being susceptible to adverse climatic conditions, was unsuitable and attention was therefore directed to the selection of new strains free from this defect and if possible with better yielding and spinning qualities. The object has now been achieved and it is only a question of two or three years more when *Verum* 262 is completely replaced by three superior strains, *V-434*, *Late Verum* and *V-438* which satisfy the needs of the different cotton growing areas of the province. They are also expected to replace the local short staple varieties wherever possible.

V-434 has proved its superiority over all other new strains in almost every part of the province under varied conditions of soil and climate. It is prolific, wilt resistant, quick in forming buds and setting bolls and

comparatively low shedding. It has also good lint characters and high ginning percentage. It spins upto 32 s standard warp against 22's of V 262 and 10 to 12 s of local cotton and fetches high premium on Broach.

Late Verum suffered considerably during the year under report owing to the early cessation of the monsoon and the total absence of late rains. It is particularly suitable for areas where the monsoon lasts till late in the season. It has nearly all the desirable characters of V 434 and spins upto 36's standard warp.

V 438 is specially suitable for soils of lighter descriptions and is expected to cover soon a large area in Nimar district. Its lint is almost as good as that of V 434.

Of the other new strains under tests, *Buri A K* special and No 107, the two American types, have done well again and there is already good demand for their seed from Nimar district and many places in Berar. They spin upto 44 s standard warp. Work on *Ban*: 306 and *E B* 31 (*indicum* types) continued on the lines of previous years. Six new promising strains have been isolated from them and they are being tested for wilt resistance.

57 *The Entomological Scheme*, which commenced in June 1934, has for its object the preliminary survey of the cotton boll worm pest in the Central Provinces and Berar where it has been doing much damage to cotton with a view to ascertain its incidence, method of carry over and the extent to which the results obtained from the Surat Boll worm Clean up Scheme can be usefully applied to this province. The work of the past two years shows that three types of boll worms viz., the spotted boll worm (*Earias fabea*) the pink boll worm (*Platyedra gossypiella*) and the cotton boll worm of America, locally known as gram caterpillar [*Heliothis (chloridea) obsoleta*] are the cause of much damage to the cotton crop in the provinces. The spotted boll worm was first observed in the Central Provinces in the last week of July when the cotton crop was at the stage of seedlings and later on it became a serious pest. During the year 1934-35 the population of the spotted boll worm remained low till the middle of October and thereafter it began to increase till the end of November when it reached its maximum. With the beginning of December the population began to decline gradually till it reached the lowest level at the end of January. As the time of boll development coincides with the maximum increase of the population of the spotted boll worm the damage done to cotton by this insect is serious.

The pink boll worm is not, on the other hand, a serious pest in the Central Provinces and Berar. It appears from September onwards and its maximum population is reached sometime in January. As the pink boll worm, unlike the spotted boll worm, prefers mature bolls to buds and

tender bolls and also as its maximum population is reached when all the cotton pickings are over, the damage done by this insect is not serious.

The gram caterpillar was hitherto unknown in India as a cotton pest and it has been found out this year for the first time that the damage done by it to cotton in Berar is as serious as that of the other two boll worms. Like the spotted boll worm, the gram caterpillar begins with boring the tender shoots of cotton when they are fully developed in October when after temporarily attacking the cotton crop ends the

As regards the carry over of the three boll worms, the last picking of cotton is usually over by the month of January and there is an interval of nearly six months between the old and next new crop. The boll worms have however no difficulty in tiding over this period as according to the local practices of cultivation cotton plants in many localities are not removed off the fields till about the middle of May. In May and June the supply of food in cotton fields becomes scarce and during this period they live on the available alternative food plants such as *Hibiscus esculentus*, *H. panduriformis*, *H. cannabinus*, *Abutilon* spp., hollyhock and perennial cotton trees.

The foregoing account shows that the position of the boll worm pest in the Central Provinces and Berar is about the same as in Gujarat and the only practical way of controlling it is to adopt clean up measures similar to those adopted in Gujarat, viz., the uprooting of cotton stalks and stubbles and eradication of alternative host plants as early as possible after the harvest of cotton.

UNITED PROVINCES

different cotton growing areas of the province. The survey was continued during the year in Moradabad, Naini Tal and Bijnor districts of Rohilkhand Division and representative samples were collected from no fewer than 2,479 villages. The examination of these samples show that the predominating type of this tract is a narrow lobed, yellow flowered variety with varying quality of lint. White flowered variety is comparatively rare and broad lobed white flowered type is rarer still. 1,321 of these samples have been retained in a preliminary selection and only the promising few of them will be tested next year.

The single plant cultures of the selections made out of the material collected in 1933 from Rohilkhand districts were tested during the year

and all promising plants were selfed and their ginning percentages were worked out. The unselfed plants of all cultures were also picked and examined for quality of lint and the best of them were retained for testing their ginning output next year. A large number of single plant cultures selected out of the material obtained in 1934 from Bundelkhand districts and adjoining States were likewise tested and all the promising plants were selfed for further tests.

BENGAL

59 *The Comilla Cotton Scheme* has for its object the botanical and systematic study and improvement of the commercial grade of *Cernuum* cotton and was started in December 1934. The work of the year mainly consists of testing the field and commercial characters of the single plant selections obtained last year from different types of *Comillas* and Assam cottons and making as in last year further selections from the cultivators' fields. Reciprocal crosses were also made with two local types and *Garrow Hill No 6*.

BURMA

60 *The Cotton Improvement Scheme* was started in April 1931, with the object of bringing home to the cultivators of the Wagale tract, by means of practical demonstrations, the better methods of cotton cultivation. The Committee provides funds for the employment each year of not more than 24 demonstrators and for the purchase of the necessary implements for demonstration. During the year under report there were 24 demonstrators.

of cultivators conserving manure and the area under improved layout have considerably increased since 1931 when the scheme was started.

HYDERABAD

61 *The Date and D. General Colonies - 1 - 1935* with
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good spin. on in
Hyderabad State *Gorani* or *Bans* is probably the best of the indigenous cottons from the point of spinning. It is, however, poor in yield and Local Government
by now, completely neglectum.

The work of the year mainly consists of testing old and new strains and making new single plant selections from *Gorani* mixture and short staple

varieties. There were four varietal tests, two for the comparison of *Gaoran*: or medium staple strains intended for the *Gaoran* tract and two of short staple strains for the short staple areas of Parbhani and Aurangabad districts. In one of the first two tests which was repeated at Parbhani, Nanded and Mudhol the combined results show that all the old strains tested, viz., *G 4*, *G 6*, *G 55* and *P 25* are about equal to one another in yield and superior to the local *Gaoran* mixture in every respect. In the second test at Parbhani with the exception of *G 6* and *G 60* all other strains, viz., *G 4*, *G 3B 1*, *G 58 E* and *P 26* gave higher yields than the same control *Gaoran* mixture. *G 6*, an early maturing variety, suffered more than other varieties from abnormal weather conditions and heavy boll worm attack. In the remaining two tests *Havr 3*, a *roseum* strain, proved again a better yielder than all other strains tested. There were two other similar tests between a large number of new strains and a few old ones. The results show that of the 29 new *Gaoran* strains tested four, viz., *G 4 B*, *G 4 B4*, *G 4 B5* and *G 58 A1* are likely to prove satisfactory while none of the new short staple strains come up to the level of *Havr 3*.

G 4 and *G 0*, which have given very promising results in comparative trials during the past three years, were tested this year side by side with *Gaoran* mixture as control in cultivators' fields. *G 4* failed for some reason or other to compete successfully with the control while *G 6* fared better. *G 4* and *G 6* were also tested on a commercial scale on 900 and 500 acres respectively in Nanded district. Here also *G 4* failed to come up to the expectation while *G 6* gave satisfactory yield. *G 4* and *G 6* spun up to 33s and 40s warp counts respectively.

62 *The Pink and Spotted Boll worm Scheme* was started in January 1933, with a view to ascertain (a) the actual amount of damage done to cotton in the Godavary valley by the boll worm pest, (b) the progress of its attack on the growing crop, (c) the mode of its carry over from season to season and (d) the effect of the likely control measures. The work of the year under report is more or less a repetition of what was done during the last year and consists of (a) a survey of the incidence of the boll worm attack and damage done by it to the harvested crop and (b) the study of the behaviour of the full fed larvae of pink and spotted boll worms and the manner the boll worm pest is carried over from one season to the next. The results show that as observed during the last year, the spotted boll worm is practically never absent and rapidly increases in numbers in September and October, when the weather conditions are favourable. The maximum incidence of its attack is attained in December about the middle of February during the off season on cotton host plants and pupates in cotton parts and in the soil. The damage done by the spotted boll worm during the year amounted to 10 to 28 per cent of buds, 20 to 58 per cent of green bolls and 7 to 8 per cent of *lapas*.

The pink boll worm pest makes its first appearance from June onwards and reaches its maximum incidence in January February when it begins to decrease till it becomes negligible at the end of April. It continues as short cycle larvae on "stand over cotton" till the beginning of May. Thereafter it spends a short time in the quiescent stage and emerges as long cycle moth on the return of favourable weather after the setting in of the South West monsoon. The long cycle moth finds ready breeding ground in the previous year's crop still left in the fields in many localities.

survive in the stored seed. The damage done by this insect is estimated at 14 to 35 per cent of the yield.

The gram caterpillar, *Hechotis (Chloridea) obsoleta*, which has been found to be causing much damage to cotton in the Central Provinces and Berar, has not yet attracted much attention in Hyderabad State.

BARODA.

63. *Root Rot Scheme*—This scheme was started in February 1932 with the double object of studying the root rot disease and securing a few suitable strains of cotton which are resistant to this disease. The work of the past four years shows that the disease is less severe in years of normal rainfall than in years of high rainfall and also in late sown crop than in early sown crop. The affected cotton roots contain the organisms of *Macrophomina phaseoli*, *Nemas* and some *Fusaria* which are also found in several other crops and weed plants suffering from similar disease, but the infection experiments show that while the first two organisms are the real cause of the disease, the *Fusaria* are practically harmless. The activity of *Macro-*
mum at 36° C. Sucrose appears has retarding effect, but *Sclerotia* when they are exposed to liquor however killed when exposed to formaldehyde.

On the Botanical side, five selections, viz., *K S*, *B S*, *D S*, No. 8 and No. 9, are found more resistant to root rot than the control and no significant difference has been noticed between themselves, though *K S* looks a little more promising than the rest.

64. *The Goghar Cotton Survey Scheme* is similar to the *Goghar Cotton Survey Scheme* in the Bombay Presidency and has for its object the survey of *Goghar* cotton crop in Baroda State, with a view to trace the produce to ginneries and induce them to gin it separately and dispose of the seed for cattle food. During the year under report the survey was again confined to the same four talukas that were dealt with last year, viz., Navsari, Mabuva, Palana and Oandevi, though the number of villages was increased to 118.

from 95 of last year. The total area surveyed was about 55,000 bighas (32,353 acres) belonging to 6,409 cultivators, and only 85 of the latter, all in Navsari taluka, were found growing *Goghari* as more than 5 per cent mixture. Nowhere in the remaining three talukas did the *Goghari* mixture exceed 5 per cent, while in Gandevi taluka the entire cotton crop was practically free from it. A list of the names of cultivators who grew more than 5 per cent mixture was circulated to the ginowners who had undertaken to gin such cotton separately and sell the seed for cattle food. The Bomhay Cotton Control Act has been applied to the Baroda State, with necessary modifications and omissions, to meet the requirements of the State. This will, it is hoped, effectively check, if not completely eliminate the menace of *Goghari*.

65

in Januar

Bombay

and effective implement for uprooting cotton stalks and stubbles and thus encourage the cultivators to fight against the holl worm pest by cleaning up their cotton fields as soon as the last packings of karpas (seed cotton) were over. The work was started in Baroda and Navsari districts on the same lines as in Broach and Surat districts of the Bombay Presidency, and as a result of intensive propaganda, it was possible to distribute 3,000 plant pullers in Baroda district and 577 in Navsari district. The demand in Baroda district was so great that it could not be met by the manufacturers and many more plant pullers would have been sold if they had been available. In Navsari district, on the other hand, the demand was low due to the propaganda being started late and also to a feeling among the cultivators that by uprooting cotton plants the physical texture of the soil is interfered with, the low demand was also due to the plant pullers being purchased in the adjoining villages of the Bombay Presidency by some of the cultivators.

BIKANER.

66 *The Gang Canal Scheme*—The opening of the Gang Canal under the Sutlej Valley Scheme resulted in the colonization of a new and practically uncultivated area, now known as the Gang Canal area, with immigrant peasants mostly from the Punjab who had been accustomed to the cultivation of the Punjab Desi and American types of cotton. The local conditions being different from those obtaining in the Punjab with regard to the supply of irrigation water which proved uncertain, it was feared at one time that the area under cotton would be seriously reduced. It was therefore considered necessary to enact this scheme for the purpose of studying the local problems of agriculturists and obtaining by selection or hybridization one or more superior types of cotton suitable for the locality. The scheme

that Cawnpore 520 (*Dest.*) is the most profitable variety to grow in this locality. Cawnpore 520 is superior to Mollison (*Dest.*) in every respect and arrangements are being made for the multiplication and distribution of its seed. It gives best results when it is sown in the middle of May though its sowings could be extended till the latter part of June without any loss in yield, June sowings however slightly lower the ginning outturn. It also does not require much watering and gives normal yield with as few as four irrigations when they are suitably adjusted. It will thus be seen that the usual short supply of water in the hot weather need not prevent the cultivators from sowing as much cotton as they wish on the water then available.

MYSORE

67 The Doddahatti (American) Cotton Scheme was sanctioned in February 1935 for the purpose of breeding suitable types from the local *Doddahatti* or American cotton, resistant to "Red Leaf" disease which stands in the way of the expansion of this crop in the Irwin Canal area in Mysore State. The work of the year in the Central Laboratory, Bangalore, indicates that Co. 2 (*Cambodia*), Gadag No 1, 295-F-21, Ashmoun-37 and Uganda varieties are more susceptible to "Red Leaf" than 4-F 98, Sea Island, Co 1, Boss III-16 and Arboreum varieties and crosses between Ashmoun and *Peruvium*, 4-F 98 and *Peruvium* and *Sakel* and *Peruvium*. At the Irwin Canal Farm 38-F, 4 F and M A II were sown from the 1st May, at 15 days' intervals with a view to find out if there was any relation between the disease and the time of sowing. The results indicate the existence of such relation. A large number of crosses was made during the year between exotic, indigenous and wild varieties and the behaviour of their progenies to "Red Leaf" will be studied next year.

CHAPTER V.

SEED DISTRIBUTION SCHEMES

68 During the first five years of its existence, the Committee devoted itself chiefly to botanical and other research on cotton, but in 1929 it felt that if its work was to be of practical benefit, the results obtained by research should be made easily available to the cultivator. In this year, therefore, the Committee adopted the policy of helping Agricultural Departments and Co-operative Sale Societies in the more extended distribution of pure seed of improved varieties of cotton. Since 1929, twenty seed distribution and extension schemes have been sanctioned and of these 17 are at present in operation. Three of the sanctioned schemes for one reason or another never started, one of these has since been withdrawn and the other two have been merged in a larger and more comprehensive scheme. A short account of these schemes is given below.

MADRAS PRESIDENCY

69 *The Tiruppur Co 2 (Cambodia) Seed Extension Scheme*—The Madras (Tiruppur) Seed Extension Scheme was sanctioned in 1929 for a period of five years with the object of providing for the pay of an officer to act as an adviser to a group of Co-operative Societies in Coimbatore District which were growing improved strains of Cambodia cotton and also to help the Agricultural Department in their seed distribution work. It started work in May 1931 and was extended in June 1936 for a short period of three months. This scheme was amalgamated in 1933 with a new scheme known as the Tiruppur Co 2 (Cambodia) Seed Extension Scheme which was sanctioned in August 1932 for a period of five years for the distribution of Co 2 seed in the Salem and Coimbatore districts through the agency of the Madras Agricultural Department and the Tiruppur Co-operative Trading Society. The object of the second scheme was the maintenance by the Agricultural Department with a grant from the Committee of a seed multiplication area of not less than 6,000 acres, and the distribution by the Society to the cultivators of the pure seed produced in this area for 100,000 acres. The Committee has further guaranteed the Tiruppur Co-operative Trading Society its actual loss on seed transactions up to a maximum of 10 per cent of the capital invested for the purchase of seed and interest thereon at 5 per cent. In 1934-35, the cotton crop in Tiruppur was so badly affected by pests and adverse climatic conditions that it gave only a poor average yield of about 420 lbs of kapas per acre. The total quantity of pure seed obtained from the multiplication areas and selected cultivators was 1,348,171 lbs of which only 1,009,471 lbs were sold for sowing in 1935-36, the rest being disposed of as cattle food.

In 1935-36, the Department of Agriculture issued pure seed for 6 249 acres of seed multiplication area but due to the failure of rains and the inadequacy of water in wells at the sowing season the cultivators utilized it for 5 320 acres only by sowing at a higher seed rate. For the same reasons the yield of cotton is not expected to exceed 250 lbs per acre. That Co 2 is appreciated both by the ryots and merchants is evidenced by the fact that the natural spread of this variety of cotton exceeded 120 000 acres during 1935-36 in addition to the seed multiplication areas. The premium obtained per candy of 754 lbs of Co 2 cotton over local Cambodia ranged from Rs. 7/8 in September 1935 to Rs. 12 in November 1935.

BOMBAY PRESIDENCY

"**0 The Hubli Seed Extension Scheme**—The scheme was sanctioned in November 1929 for a period of five years. It commenced work in June 1930 and was extended for one year from the 31st May 1930. It has since been merged in the revised scheme for the extension of Jayawanti and Gadag 1 cottons in the Southern Division of the Bombay Presidency. Under the original scheme it was intended that the Department of Agriculture with the aid of a grant from the Committee should maintain a seed multiplication area of about 15 000 acres of Jayawanti cotton and the Hubli Co-operative Cotton Sale Society should distribute the seed thus obtained to cover about 200 000 acres. In so far as the Society was concerned the Committee agreed to make good to it any losses in its seed business up to a maximum of Rs 5 000 every year and to pay interest at 5 per cent on the capital invested for the purchase of pure seed. The Committee further granted the Society a loan of Rs " 629 free of interest to be recovered from the profits in the seed transactions. During 1930-36 the Department of

expected from the reserved area 1 100 000 lbs were stocked for distribution in 1936-37. During the season 1935-36 the yield of Jayaram cotton was reduced by 25 to 30 per cent on account of unfavourable weather inadequate soil moisture and mist and rains during the picking time in some places. The average price obtained for Jayaram cotton was Rs 11 more per naya (1 344 lbs) of seed cotton than for the local cotton. It has been estimated that as a result of the operation of the scheme from 1930-31 to 1935-36 the total gain to the growers of Jayaram cotton in Dharwar district alone comes up to Rs 6 lakhs per annum.

71 The Gadag Seed Extension Scheme.—This scheme which started in June 1930 is almost identical with the Hubli scheme except that the type of seed intended for distribution is Gadag No 1 and the seed multiplication area is 24,400 acres whilst the work of distribution is done by the Gadag Co-operative Cotton Sales Society. The Committee also granted the Society a loan of Rs. 7,292 free of interest to be recovered from profits in seed

transactions In 1935 36, the Department of Agriculture maintained a reserved area of 25,258 acres and handed over to the Society 1,250,892 lbs

average premium paid for *Gadag 1* over pure unmixed *Dharwar American* amounted to about Rs 25 per *naga* or Rs 3 per acre The total gain to the growers of *Gadag 1* cotton in Dharwar district has been estimated at Rs 4 lakhs annually during the past six years

72 *The Athani Seed Extension Scheme*—The main difference between this scheme and the previous two schemes is that this scheme was run entirely by the Agricultural Department whereas the first two were conducted partly by the Agricultural Department and partly by the Cotton Sile Societies The Athani Seed Extension Scheme which has for its object the extension of *Jayawant* seed in the Athani Taluka of Belgaum District was sanctioned in December 1931 for a period of five years and commenced work in April 1932 During the year, 1935 36, the Department of Agriculture was able to distribute to cultivators 310 283 lbs of *Jayawant* seed to cover an area of 31,028 acres and maintained a seed multiplication area of 5,847 acres from which 350,000 lbs of pure seed were secured and stocked for distribution in 1936 37 *Jayawant* cotton, obtained from the reserved area, fetched a premium of Rs 2 8 to Rs 3 per *Akh*; of 200 lbs of *Kapas* over local cotton The extra gain to the growers of this cotton has been estimated at Rs 81,033 annually The Athani scheme has worked so satisfactorily that it has formed the basis of the new seed multiplication scheme, viz., the Revised *Jayawant* and *Gadag No 1* Scheme, for the whole division which was started in June 1936

73 *The Revised Jayawant and Gadag No 1 Scheme*—Five separate schemes were sanctioned by the Committee in 1929 for the distribution and extension of *Jayawant* and *Gadag No 1* cottons in the Southern Division of the Bomhay Presidency These were the Hubli, Gadag, Athani, Haveri and Bailhongal Schemes The last two schemes could not be started for several reasons whilst the first two indicated certain defects in their working which stood in the way of their continuance after the expiry of their sanctioned periods The revised scheme is designed to embrace not only the areas covered by the five schemes mentioned above but also other areas in Dharwar, Belgaum and Bijapur districts for which there were no specific schemes The revised scheme will be operated from seven centres, viz Hubli, Haveri, Navalgund, Bailhongal, Athani, Bijapur and Bagalkot through the agency of Co operative Societies but under the general control of the Agricultural Department Societies agreeable to the conditions imposed will receive a subsidy not exceeding annas 6 per bag (140 lbs) to meet handling charges and losses incurred by them The keynote of this new scheme which came into operation in June 1936 is decentralisation so that no single agency should have too great an area to cover or too great

a responsibility to carry This scheme has been sanctioned by the Committee for a period of five years at an estimated expenditure of Rs 2,66,772 of which a sum of Rs 88,332 represents the savings of the original five schemes referred to above Sanction to the scheme is subject to the condition that the Government of Bombay should bear 25 per cent of the net additional cost but as the Local Government have agreed to bear their share of the cost for a period of or the policy to be adopted the cost of schemes finan ods, the revised scheme will be in operation for a period of one year only in the first instance

74 The Surat Seed Distribution and Extension Scheme — This scheme was sanctioned in 1929 for two years and extended for two more years in 1931 pending the decision of the Committee on the merits of the two rival varieties of 1 A and 1027 A L F In January 1934 the Committee finally decided to confine its attention to the distribution of 1027 A L F only and extended the scheme for five more years Thus the scheme will continue till March 1939 Owing to severe frost in the middle of January 1935 and the consequent failure of the cotton crop over a large area in the Surat district, it was not possible to secure more than 1,118,908 lbs of pure seed of 1027 A L F but even all this quantity could not be distributed owing to the unreasonable attitude of the cultivators who attributed the failure of cotton to this seed, to the advice of a few money lenders in favour of Khandesh cotton and to the difficulty experienced by farmers in finding ready money for the purchase of distributed did not therefore ex supplied to the Idar and Chhota of 2,312,818 lbs during the maintained a seed multiplication area of 12,828 acres and the seed obtained from this area will be distributed for sowing in 1936-37 season

75 has for its sanctioned in May 1931 Proposals for further extension of the scheme for three years from May 1936 were considered by the Committee but its extension was sanctioned for one year only pending the decision of the Government of Bombay on the condition laid down that a part of the cost of the scheme during the remaining two years should be borne by the Government As a result of the scheme being in operation during the last five years the cultivation of Banilla cotton in Khandesh has extended over an area of 130,000 acres with a production of about 30,000 bales This cotton is susceptible to wilt and has also deteriorated in spinning quality since its introduction In spite of these defects, however, it is superior to local cotton and gives better returns In 1935-36 pure Banilla fetched a premium of Rs 10 to Rs 15 per candy over local cotton Spinning tests on Banilla

cc
B
tl

Farms persistently declined in spinning quality during the last two years. During 1935-36 the Department of Agriculture maintained a controlled area of 20,112 acres and distributed for general cultivation 9,65,000 lbs of pure seed obtained from the previous year's crop.

76 The Deccan Canals (Banilla) Seed Extension Scheme—This scheme for the supply of pure Banilla cotton seed for the Deccan Canals area was sanctioned in January 1934 and started work in April 1934 in the Government Farm at Kopergaon. Unlike other seed schemes this scheme is expected to be self supporting. Of the sixty acres of farm land taken on lease, Banilla occupied in 1935-36 a little over 30 acres, the rest of the area being cropped with Spanish peanut. Cotton suffered considerably from and low rainfall and other adverse factors, and gave a total yield of 22,378 lbs of lint. All the kapas was ginned on the Farm and out of the total quantity of 10,700 lbs of pure, healthy seed obtained, 10,000 lbs were distributed to cultivators and the balance was retained for sowing on the Farm in the following year. Groundnut gave an average yield of 1,630 lbs per acre. In the irrigated Deccan Cenels areas Banilla gives as high an yield as local NR and fetches a good premium over the local variety. The total area expected to be covered by this cotton is 30,000 acres.

77 The B D 8 Seed Extension Scheme—This scheme for the distribution and extension of B D 8 cotton seed was sanctioned in August 1935 for a period of 3 years and commenced work in December 1935. From a field survey undertaken by the Department of Agriculture at the beginning of the scheme it was ascertained that an area of 3,023 acres was under pure B D 8 cotton which yielded 474,534 lbs of pure seed and 252,032 lbs of lint and the latter fetched a premium of Rs 40 to Rs 53 per khandy of 784 lbs of lint over Broach cotton. The difficulties in the way of expansion of this cotton are the tendency on the part of buyers to underestimate the value of its lint, its low ginning percentage and the absence of a well organised cotton market for Broach staple cotton. Cultivators, however, are in favour of this cotton because of its high yield of kapas and wilt resistance.

SIND

78 The Sind Seed Distribution and Extension Scheme—The Sind Cotton Extension Scheme commenced in April 1931 and on the expiry of its first sanctioned period of 3 years it was extended for a further period of 5 years. The work of the past five years has definitely proved that the Right Bank area of the Indus is as suitable as any other part of Sind for growing long staple cotton and it is now proposed to pay hereafter special attention to seed distribution, the introduction of better methods of cultivation, and

the extension of cotton in lands under the Barrage area. Cotton cultivation was unknown on this side of the Indus before the commencement of this scheme but as a result of the intensive propaganda carried on by means of field demonstrations, shows, public meetings, etc the area under cotton has now gone up to 17,000 acres against 4,000 acres in the previous year and 25 acres in 1931-32. During the year under report there were 40 demonstration plots on the Right Bank area for the comparison of 4-F 98 and Sind Sudhar (289 F 1) and contrary to the experience of previous years in most cases the latter gave better yields than the former. Sind Sudhar is the better yielder of the two but being a late maturing variety it suffers more than 4 F 98 from frost. The year under report was milder than usual and was therefore quite favourable for Sind Sudhar. The sowing date experiments showed that the best time for sowing cotton in this area is from the middle of April to the 30th of May. The Agricultural Department distributed on the Right Bank 3965 maunds (326,263 lbs) of pure seed to the cultivators.

On the Left Bank Sind Sudhar having proved definitely during the past four years to be the best suited for Thar Parkar district and the lower portion of Hyderabad district, the comparative tests of 27 W N (Desi), 289 F 1, 262 and 289 F 11 were continued during the year under review in the upper part of Hyderabad district only in Hyderabad district while it closely followed in Nawabshah district. The chief difficulty in extending high quality cottons like Sea Island 24 and Boss III 16 is the absence of marketing organisation. These two varieties were grown during the year under review on an area of 1,400 acres and they gave an average yield of 7 maunds per acre.

The Department of Agriculture have developed a regular system of seed distribution suitable for the conditions of Sind and on the lines of this system they were able to distribute 7,400 maunds (608,000 lbs) of Sind Sudhar, Sind N R, Sea Island and Boss III 16 seed. The total area sown to cotton in 1935-36 on the Left Bank was 790,858 acres against 669,100 acres in 1934-35.

CENTRAL PROVINCES AND BERAR

79. The Verum Seed Distribution and Marketing Scheme — In November 1930 a period of one year in the first instance extension of Verum 262 cotton and was extended annually till the end of July 1931, when it was replaced by a combined scheme sanctioned for a period of 3 years for the extension and marketing of long staple cotton. During the year 1935-36 the Agricultural Department distributed 4,143½ handies (3,218,504 lbs) of pure seed of long staple varieties sufficient to cover an area of 103,537 acres, whilst 5,591 handies (4,345,696 lbs) of pure seed, obtained from the seed multiplication area of that year, were

stocked for distribution in 1936 37. The quantity of staple cotton disposed of in 1935 36 amounted to 6 823 bales which fetched an average premium of Rs 42 9 over Broach and Rs 60 4 over Oomra equivalent to a premium of 20 82 per cent on Broach and 32 26 per cent on Oomra which compares very favourably with the figures obtained in all the previous years since 1930 31 with the exception of 1934 35 when the corresponding premia were Rs 62 3 and Rs 82.

UNITED PROVINCES

80 *C 402 Seed Distribution Scheme*—This scheme was sanctioned in January 1934 for a period of five years for the distribution of *C 402* seed in the Hardoi Lucknow and Sitapur districts of the United Provinces and commenced work in May 1935. Though superior to the local cotton this variety requires more careful cultivation and it was therefore decided early in 1935 to restrict its distribution to Madhoganj and Bilgram tehsils only where it gives satisfactory results without extra labour and to extend in the remaining areas covered by the scheme another variety *C 520*, which is better suited for them than *C 402*. The latter was grown during the year on an area of about 1 340 acres which gave an average yield of 4 to 6 maunds per acre. *C 520* was demonstrated on a total area of about 150 acres in 197 localities and the yield obtained varied from 7 to 10 maunds per acre.

HYDERABAD STATE

81 *The Hyderabad Seed Extension Scheme* was sanctioned in November 1929 and started work in March 1930. It was extended for three years in January 1933 and subsequently for a further period of 6 months up to the 31st August 1936. In August 1936 the Committee sanctioned a further extension for 4½ years subject to the condition that at least 50 per cent of the cost should be met by the State. During the first two years of the scheme *Dharwar No 1* and *Gadag No 1* seeds were distributed but as a result of the experiments carried out by the Hyderabad Agricultural Department and in view of the fact that the Bombay Agricultural Department had found the *Jayawant* variety more suitable for the neighbouring areas of that province the distribution of *Dharwar No 1* seed was discontinued in 1931 32 in favour of *Jayawant*. During the year 1935 36 the Department of Agriculture maintained a seed multiplication area of 7 000 acres but due to the failure of cotton crop during the previous year in the area covered by the scheme and consequent dearth of pure seed they were unable to distribute more seed than the quantity required for 41 256 acres. Arrangements have, however, been made to obtain from seed farm areas within the State itself enough pure seed for not less than 35 000 acres in 1937 38 season and purchase the remaining quantity from selected cultivators. The Department of Agriculture have also undertaken to organise the initial stages of seed production in more than one area to minimise the danger of setback in adverse seasons and remain independent of the Bomhay Presidency for the supply of pure seed.

BARODA STATE

82 The Baroda (Navsar: Seed Storage) Scheme.—This scheme was sanctioned in February 1933 for a period of five years for the rapid spread of 1027 A L F in Baroda territory, and started operations in April 1934. Unfortunately the very first year of this scheme was marked by the occurrence of a serious frost which gave a definite set back to the spread of 1027 A L F. Owing to the damage to the cotton crop by frost, scarcity of pure seed was apprehended, but the timely step taken by the Stats Agricultural Department enabled them to secure from different sources 1,350,660 lbs of 1027 A L F seed. Of this quantity 147,655 lbs were issued for sowing 4,954 acres of the reserved area and the next year 873,239 lbs were distributed to cultivators. In 1935 36 the reserved area was carefully rogued, the produce obtained from it was ginned under the supervision of ^{was stocked for distribution}
^{pure seed on a large scale}
^{for Goghar had declined}
^{propaganda was continued in favour of}
^{the holding of meetings, the distribution}
^{Department is making serious efforts to}
make Baroda independent of the Surat Farm so far as seed supply to cultivators is concerned. It is anticipated that in about two years time the machinery for ensuring a steady supply of seed of 1027 A L F and its multiplication on a large scale will be in full and effective working order.

RESEARCH STUDENTS

83 The training of research workers in the various branches of the ^{f the Committee ever}
^{elected and trained in}
^{in India and abroad}
^{Committee's schemes,}

at the Institute of Pl: Laboratery or under awarded for periods extensions are granted

Two categories of scholarships are awarded, viz., training grants and general scholarships. Training grants are intended for Government servants who are recommended by provincial Governments and for Committee servants who are considered suitable. General scholarships are awarded to University Graduates selected by the Research Students Selection Sub Committee. Applications for these scholarships are invited by advertisement in all leading Indian newspapers.

Fifty four scholarships and eight training grants have so far been awarded by the Committee, out of these one scholarship and five training

grants were for foreign study. During the year under report two scholarships and two training grants were sanctioned, six research students were under training—four in India and two abroad.

At its meeting in August 1936, the Committee decided that in future the Director of the Institute of Plant Industry, Indore, might appoint students for training in cotton genetics at the Institute. The scholarships of these students will be paid by the Committee, but the appointments would be subject to confirmation by the Research Students Selection Sub Committee.

The expenditure on Research Studentships up to 31st August 1936 amounted to Rs 2,52,354.

P H RAMA REDDI,
Secretary

CHAPTER VI.

ANNUAL REPORT OF THE DIRECTOR, TECHNOLOGICAL LABORATORY, FOR THE YEAR ENDING 31st AUGUST 1936.

In the present report an account will be given of the work done at the Technological Laboratory between 1st September 1935 and 31st August 1936. It will be seen from a perusal of this report that during the year under review the Laboratory not only maintained at the previous high level its service to the agricultural officers in assessing for them spinning values of their prominent strains but that its resources were utilised to a much greater extent than in the past by the mills who sent their samples for tests and their problems for solution to the Laboratory. The work done at the Laboratory will as usual be described under the following five heads —

- I Spinning Laboratory
- II Research Laboratory.
- III Moisture Testing Section
- IV Publications
- V General

I SPINNING LABORATORY

The following statement gives a summary of the agricultural samples of different cottons spun and tested at the Laboratory during the period under review together with the names of the suppliers of the samples —

BOMBAY

- (1) *The Cotton Breeder, S M C, Dharwar* — 4 samples of Jayawant \times 15 crosses, 2 samples of Dh 1 \times Dh 2 crosses and one sample each of Gadag 1 and GI \times 102 E 4
- (2) *The Cotton Breeder, Jalgaon* — 9 samples of Banilias, 7 samples of Local cottons, 3 samples each of N V 57 7 and N V 56 3, 2 samples of N R 6 and one sample of N V 56 17
- (3) *The Agricultural Overseer, Padegaon* — 6 samples for irrigation experiments
- (4) *The Cotton Breeder, S G, Surat* — 4 samples of selections, 2 samples of Segregates and one sample of Surat B D 8
- (5) *The Cotton Breeder, Viramgam* — 2 samples of Segregates, one sample each of frost affected Segregate 4 1 and Wagad 8 and a sample of Wagad Local

- (6) *The Cotton Breeder, Broach*—3 samples of Selections, 2 samples of B D 8 and one sample each of Goghari A 26 and Broach Local
- (7) *The District Agricultural Overseer, Broach*—1 sample of B D 8 (Nabipur)

SIND

- (1) *Botanist in Sind, A R S, Sakrand*—4 strains of 4F-18×Meade, 2 samples of 4F 98 and one sample each of 289F-1, 285F 2, Ashmouni, Boss III, Sea Island and W N 27
- (2) *The Cotton Physiologist, Sakrand*—6 samples of 285F 2 for manurial experiments, 3 samples each of 289F 1 and 4F 98 for irrigation experiments and 2 samples of Red Leaf 289F-1
- (3) *The Cotton Supervisor, Indus Right Bank, Dadu*—One sample each of 289F 1 and 4F 98

PUNJAB

- (1) *The Cotton Research Botanist, Lyallpur*—19 samples of American Varietal Tests, 15 samples of Desi Varietal Tests, 7 samples of 38F for manurial experiments, 18 samples of 4F for irrigation experiments, 4 samples of D C cottons and one sample each of 4F, 289F, 43F and Mollisoni
- (2) *The Deputy Director of Agriculture, Hansi (Punjab)*—One sample each of 1F, 4F, 43F and 289F

UNITED PROVINCES

- (1) *The Economic Botanist to Government, U P, Cawnpore*—5 samples of C 402, 3 samples of C 520 and one sample each of Local, White Flower and Yellow Flower strains

MADRAS

- (1) *The Cotton Specialist, Coimbatore*—6 samples of Cambodia strains, 4 samples of new strains, Co 2 sample from each of Aduturai and Pollachi and one sample each of Karunganni 546, Uppam and Podupathy
- (2) *The Superintendent, Agricultural Research Station, Koulpatti*—10 samples of C 7 for different experiments, 6 samples of Selections, 5 samples of Koulpatti strains, 2 samples of K P T I and one sample of Perennial

- (3) *The Farm Manager, Agricultural Research Station, Nandyal*—2 samples of Gadag (Local and imported), 2 samples of Co 2 (irrigated and dry) and one sample each of Hagari 1 and Selection 2390
- (4) *The Cotton Assistant, Perundura*—1 sample each of Buorhon and Nadam
- (5) *The Agricultural Demonstrator, Dindigul*—1 sample of dry Cambodia (Kommaripatti)
- (6) *The Agricultural Demonstrator, Tadpatra*—1 sample of Hagari 1
- (7) *The Agricultural Demonstrator, Adoni*—1 sample of Hagari 1
- (8) *The Agricultural Demonstrator, Guntakal*—1 sample of Hagari 1

CENTRAL PROVINCES —

- (1) *The Economic Botanist for Cotton, O P, Nagpur*—5 samples of different strains and 4 samples of Bani and Verum strains
- (2) *The Superintendent, Government Experimental Farm, Akola*—1 sample of Strain 773

MISCELLANEOUS —

- (1) *The Director, Institute of Plant Industry, Indore*—13 samples of Malvi selections, 3 samples of Kbarva and Musakheri cottons, and 7 samples of Dhar Malvi sub strains
- (2) *The Cotton Research Botanist, Parbhani*—7 samples of Gaorani strains, 5 samples of Parbhani strains, 1 sample each of Parbhani American and Havri 3 and one sample each of Gaorani, Gaorani 4 and Gaorani 6 from each of Parbhani, Madhol, Umri, Nanded, Loha and Latur
- (3) *The Crop Botanist, Malwa Division, Ujjain*—4 samples of Malvi cottons, 3 samples of Verums and one sample each of Banilla, Bani 306, B XXI, K 22, G 15, G 16, G 51, Cambodia, C 520, Roseum and Local
- (4) *The Senior Assistant Botanist, Hiriyur*—2 samples each of M.A I, M A II, and Local Doddahatti and one sample each of Herbaeum 190, Selection 69, Local Sannhatti and Co 2

(5) *The Second Economic Botanist to Government, Bengal, Dacca* —1 sample of 289F cotton

(6) *The Inspector of Agriculture, Kolhapur* —1 sample each of Jaya want and Kumpta

(7) *The Superintendent, Main Farm, Raichur* —1 sample each of Hagari, Jayawant, Mungari and Local Kumpta

(8) *The Assistant Botanist, Bukalasa Experimental Station, Bombo, Uganda* —1 sample each of S G 29, N 17, S P 20, and two samples each of B 37 and Local

The following tables give the distribution of samples, lots and counts spun and tested at the Laboratory in each season since 1924 —

TABLE I—*Distribution of samples spun, 1924-36*

Province	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34	1934-35	1935-36	Totals 1924-36
Bombay	18	26	22	22	28	60	89	69	143	111	97	59	750
Sind												28	28
Punjab	14	1			42	30	10	44	55	42	23	71	332
United Provinces	7		6	11	8	7	18	7	12	6	7	11	99
Madras	2	19	59	23	30	51	66	15	28	101	30	51	466
Central Provinces			3	2	2	5	5	3	5	9	9	10	53
Miscellaneous	3	11		8	8	27	28	33	75	97	85	100	471
TOTAL	46	57	81	64	117	196	212	171	318	366	251	330	2,199
Standard Cotton Tests	6	54	49	64	33	36	27	16	16	16	16	23	362
Trade Tests and Special Tests						37	89	134	125	166	131	143	823
GRAND TOTAL	54	111	130	123	150	237	328	323	461	543	400	496	5,336

TABLE II—*Distribution of lots spun, 1924-36*

Province	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34	1934-35	1935-36	Totals 1924-36
Bombay	36	52	44	44	53	107	90	69	143	111	97	81	907
Sind												23	23
Punjab	26	4				35	41	10	44	55	42	23	399
United Provinces	14		12	22	18	14	18	7	12	6	7	11	139
Madras	4	38	100	46	60	85	66	16	23	101	30	51	625
Central Provinces	3	6	4	10	4	5	5	3	8	6	10	67	67
Miscellaneous	3	22		12	9	33	29	33	75	97	53	100	498
TOTAL	86	116	162	123	227	290	215	172	318	366	251	332	2,663
Standard Cotton Tests	34	176	142	178	63	64	54	36	36	3*	36	46	902
Trade Tests and Special Tests						37	119	166	129	175	175	175	996
GRAND TOTAL	110	292	304	306	295	391	358	394	433	573	45*	533	4,561

TABLE III.—*Distribution of Yarns spun, 1924-36*

Province	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34	1934-35	1935-36	Totals 1924-36	
Bombay	103	152	152	152	159	322	253	203	430	332	292	190	2700	
Sind												84	84	
Punjab	106	14			254	113	31	136	165	127	72	220	1238	
Un. ed Provinces	27	36	66	54	42	40	22	32	16	21	35	993		
Madras	12	108	273	138	180	255	199	53	85	303	90	151	1852	
Central Provinces	8	18	12	12	30	12	9	15	27	29	30	202		
Miscellaneous	3	53	36	27	99	100	93	227	293	250	295	1481		
TOTAL	259	332	464	384	696	881	635	516	954	1100	754	1005	7950	
Standard Cotton Tests	93	314	423	447	290	223	309	136	200	180	204	162	3183	
Trade Tests and Spec al Tests							80	243	503	256	499	810	609	3099
GRAND TOTAL	352	848	857	831	976	2184	1237	1154	410	3778	2788	1776	14232	

It will be seen from these tables that as compared with last year the number of samples spun during the period under review shows an increase of 24 per cent while the lots spun increased by 20 per cent. The number of yarns spun also shows a small increase. Among the samples received from the agricultural departments those sent from the Bombay Presidency, show a substantial decrease, but this is due to the separation of Sind Province as will be seen from the fact that the total for Bombay and Sind, remains practically the same as in the last year. Both the Punjab and Madras, show a very substantial increase in the number of samples sent to the Laboratory for tests, while the United Provinces and Central Provinces sent very nearly the same number of samples as last year. It will be noticed that, inspite of the increase from these provinces, the technological work of the Laboratory was not only maintained at its previous level but even speeded up, as is shewn by the fact that special tests were made on 143 samples this year as against 131 samples last year. The number of standard cottons also shows an increase over last year which is due to the necessity, for certain technical reasons, of repeating tests on five of these cottons. It may be mentioned here that the two new cottons from Sind have been given the easy and attractive names of Sind Sudhar and Sind N R and it is hoped that these names will prove popular among the trade.

The statement and the tables given above do not include either the small size samples which were received for fibre tests alone or samples of yarns on which tests were made at the Laboratory. A summary of the former will be found on page 69 in this report, while the latter which numbered 73 were tested for mills on payment of fees laid down by the Indian Central Cotton Committee. The small size samples relate to the strains which are as yet in the early stages of experimentation and of which sufficiently large size samples are not available for carrying out spinning tests. When the process of selection, with a view to narrowing down the number of these strains, has proceeded sufficiently far in the light of the results obtained at the Laboratory, the selected strains will be grown

in quantities sufficient for spinning tests which in due course will be made at the Laboratory. In the meantime the Cotton Breeder is guided in his selection work by the results of fibre tests which are made on his strains.

The results of the tests carried out at the Laboratory are embodied in spinning test, fibre test and yarn test reports. These reports are sent to the suppliers of the samples and, in the case of the agricultural samples received for tests at the Laboratory copies of the reports are also forwarded to the supervising officers of the cotton breeders. The cottons supplied by the East India Cotton Association, and the Bombay and Ahmedabad Millowners' Associations, which represent either the fair average samples of the season's crop or its early arrival in the market, are treated in a somewhat different way. The reports of the tests on these samples are published in the form of technological circulars which are distributed freely among the trade and the industry and copies of these circulars are also sent abroad to the principal importing countries of Indian cotton. The following table gives a statement of the number of reports falling under each class which were issued during the period under review together with the corresponding figures for the previous years.

TABLE IV — Test Reports issued, 1924-36

	1924 25	1925 28	1926 27	1927 28	1928 29	1929 30	1930 31	1931 32	1932 33	1933 34	1934 35	1935 36	Totals 1924- 36
Spinning Test Reports	7	19	19	22	21	63	92	60	87	121	112	135	758
Fibre Test Reports	1	1	5	1	7	4	7	19	30	18	19	44	156
Yarn Test Reports				1	4	4	2	3	5	3	7	13	42
TOTAL REPORTS	8	20	24	24	32	71	101	82	122	142	133	192	956

It will be seen that there is a very substantial increase under all heads in the number of reports issued from the Laboratory during the year under review. The number of fibre test reports was nearly 2½ times of that issued last year, the number of yarn test reports issued was nearly double of that issued last year, while the number of spinning test reports showed an increase of 20 per cent. When it is realised that last year as many as 112 spinning test reports were issued, an increase of 20 per cent in this figure raises it to the record figure of 135. As a result of this all round increase the total number of reports issued during the period under review rose to 192 from 138 for the last year, which represents an increase of 40 per cent.

In spite of this substantial increase in the number of samples tested in and reports issued from the Laboratory, the staff of the Laboratory remained practically the same as during the last year. Only two Research Students were added as previous experience had shown that it was wise to have at least one Research Student, in hand to meet the demands from outside on the resources of the Laboratory without seriously dislocating its work. The main burden of the increase in the work of the Laboratory fell on the

old staff who showed commendable zeal in coping with the work especially as during the year the hours of work were increased. The strength of the permanent staff of the Laboratory from year to year since 1924 is given below in the following table —

TABLE V

As at August 31 in	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936
Technical Staff	8	11	20	24	27	27	32	32	32	33	34	34	34
Research Students	1	3	6	4	3	2	1	1	2	2	2	2	2
Purification Chemists		2	4	2	2	2	2	2	2	2	2	2	2
TOTAL	8	14	28	32	32	31	35	35	34	33	36	36	38

It may be added that it was found necessary, when the rush of samples became great, to employ four temporary junior testers for a period of three months each to enable me to meet the growing demand upon the resources of the Laboratory.

CLASSIFICATION OF SAMPLES

The samples received for tests at the Technological Laboratory fall under the following four classes —

- (a) Agricultural samples
- (b) Standard Indian cottons
- (c) Trade samples
- (d) Technological samples

We shall now briefly describe the work done under each head —

(a) *Agricultural Samples* — These samples are mainly supplied by agricultural officers engaged on cotton breeding work in the different provinces of India. They either represent new or improved varieties which are under trial or such samples as are being grown in connection with the various botanical and physiological investigations undertaken by the Agricultural Department. Tests on new varieties are usually made on small samples and are restricted to fibre tests for the first few years. Guided by the results of these tests, only the most promising strains are retained for further experimentation. These are grown in sufficiently large quantities to enable the cotton breeder to send 10 lb. samples to the Laboratory for spinning tests. The spinning tests are usually made for a number of years in order to make due allowance for seasonal variation and finally the most promising variety from the point of view of better yield, fibre properties, ginning percentage and higher spinning performance is selected for the purpose of multiplication and general cultivation. Among the other category fall those samples which are raised in connection with such investigations as the effect of different manurial treatments, the effect of

different dates of sowing, etc., etc. They are also usually repeated for a number of years to take into account the seasonal variation and at the end of each investigation a final report comprising the results for all the years is also issued to the officer who supplied the samples. Among the agricultural samples subjected to fibre and spinning tests this year at the Laboratory, mention may be made of the following

(1) *Uganda Cottons*—As stated in my previous reports, the Indian Central Cotton Committee has agreed to test, free of charge, eight samples of cottons supplied by the Agricultural Department, Uganda. The report containing the results of these tests on the last year's samples was considered by the Technological Research Sub Committee who recommended that the Department should be asked to include a sample of N 17 cotton which forms the control for Busoga. This recommendation of the Technical Sub Committee was conveyed to the Department concerning N 17 cotton along with the other samples.

(2) *Effect of differential irrigation upon the fibre properties and spinning quality of cotton*—This investigation has been in progress for some time past. The available results were considered by the Technological Research Sub Committee who recommended that in view of their useful and interesting nature, they should be sent up for publication in a suitable journal. In view of the fact that the effect of differential irrigation on the stand in the field, the shedding of flowers and bolls, the yield per acre, etc., is equally important, it was thought highly desirable that the account of this investigation should be complete with the collaboration of the cotton breeders. Accordingly the cotton breeders concerned were requested to send in their contribution and the bulletin detailing the results of this investigation have been received from the amounts of cotton supplied by the Coimbatore cotton breeders.

(3) *Tests on long staple Sind cottons*—In view of the increasing importance of the long staple cottons which can be grown in the new area brought under cultivation in Sind, preliminary tests on two promising varieties, namely Sind Sea Island and Boss III cottons, were made last year and the results were placed before the Technological Research Sub Committee for their decision as to any further action that may be regarded desirable. The Technological Research Sub Committee suggested that in the ensuing year tests should be made not only on samples supplied by the Agricultural Department, but also those used by the mills in order to assess the variation in quality that may occur between the grower and the consumer. In accordance with the recommendation of the Technological Research Sub Committee tests were made during the period under review on five samples of long staple Sind cottons of which two were supplied by the Agricultural Department, Sind, and three by mills and firms using

these cottons. In addition, tests were also made for the purpose of comparison, on three samples of Giza 7 and one sample of Maarrad cotton. The detailed report containing the results of these tests was placed before the Technological Research Sub-Committee who recommended that these tests should be repeated for one more season in order to make due allowance for seasonal variations. Samples of these cottons, as in the past, are sent to the Agricultural Departments and from the

(4) *Hyderabad Gaorani 4 and Gaorani 6 cottons*—It has been stated above that in the initial stages of experimentation tests in this Laboratory are generally made on small size samples which are tested for their fibre properties. Subsequently when the field of selection is narrowed down sufficiently, spinning tests are made on moderately large size samples. A good illustration of this useful principle will be found in the case of these two cottons which were tested for the first time in 1930-31, when 35 samples were received for fibre tests. In the following season fibre tests were made only on 14 samples, which gave the best results in the previous year, while in 1932-33 the selection was narrowed down to 6 samples which were

In the following two seasons the tests were reduced to three, out of which Gaorani 4 and Gaorani 6 were distributed for district trials at six different centres. In the year under review spinning tests were made on 12 samples of the two cottons grown at different places and a comprehensive report detailing the results of these tests showing differential response of each variety to locality of growth, etc., was sent to the Agricultural Department.

(5) *Hiriyur cottons grown on dry and wet lands*—Two samples of each of three Mysore cottons were received for spinning tests under rain fed conditions with irrigation. Spinning tests were made on these six samples, and it was found that in all cases the sample grown under rain fed conditions gave a much better performance than the parallel sample grown under irrigated conditions. The results of these tests, which are likely to be valuable to the cultivator, were communicated to the Department in a report with the recommendation that these tests may be repeated in the following season.

(6) *289F Cotton grown in Dacca*—Although Dacca was at one time famous for its cotton, the progress of the cotton industry there has been slow. Bengali cotton has been introduced and has given good results. It compares very favourably with the 289F cotton grown in the Punjab and the progress of this cotton may be watched with interest.

(7) *Desi crosses from Lyallpur*—During the period under review four *desi* crosses from Lyallpur, D C 1, D C 6 D C 7 and D C 13, were tested for fibre properties and spinning performance and were found to be much superior to Mollisoni. The best results among them were given by D C 13. In order to find out its performance under mill conditions, arrangements were made with a local mill for testing a bale of this cotton which was supplied by the Cotton Research Botanist, Lyallpur. The mill expressed their complete satisfaction with the performance of this cotton which has since been named Juhlee cotton, and supplied a sample of cloth made from it, which was sent to the Cotton Research Botanist, Lyallpur.

(8) *Podupatti cotton from Malabar*—This is the first time that a cotton has been received for tests from Malabar. It was found suitable for spinning upto 11 s standard warp counts and its behaviour in the ensuing seasons will be watched with interest.

(b) *Standard Cottons*—These cottons mostly represent the improved varieties which now cover some 15 per cent of the total area under cultivation of cotton in India. During the period under review no change was made in the list of standard Indian cottons. As usual 4 page circulars were issued on the following ten cottons which were received sufficiently early in the season —

- 1 Punjab American 289F
- 2 Verum 262 (Nagpur)
- 3 Verum 262 (Akola)
- 4 V 434 (Akola)
- 5 Lato Verum (Nagpur)
- 6 Umr Banu
- 7 Punjab American 4F
- 8 Cambodia Co 2
- 9 Sind Sudhar
- 10 Surat 1027 A L F

The bulletin containing the results of tests on all the standard Indian cottons for 1935 36 together with the results for the previous seasons was issued in July 1936.

(c) *Trade samples*—(1) In order to bring the work of the Laboratory into closer touch with the industry and the trade, it has been the practice for some time past to undertake spinning tests on samples of trade varieties of Indian cottons. These samples fall under two heads. Under the first head are included those samples which are supplied by the East India Cotton Association. These represent the fair average quality of different varieties of Indian cottons which form the bulk of the cotton crop and are selected by the Cotton Committee of the East India Cotton Association, who receive reports from the mills members of the Bombay

and Ahmedabad Millowners' Associations and which represent the early arrivals of the various Indian cottons into the local markets. These samples are supplied by the mills who also kindly supply valuation reports on their samples. Both types of samples are subjected to a thorough spinning test and the results of these tests are published in 2 or 3 page circulars which are distributed to the trade and industry. Copies of these circulars, containing full information regarding the waste losses, spinning behaviour and yarn characteristics of these cottons, are also sent abroad to countries which import Indian cottons in appreciable quantities. The following statement gives a description of the trade samples which were tested during the period under review —

Cottons supplied by the East India Cotton Association

1	Coompta (1934-35)	10	Dholleras
2	C P No 1	11	Broach
3	Berar	12	Jagadia
4	Khandesh	13	Surat
5	Muttia	14	Navsari
6	Latur	15	Kalagun
7	Nanded	16	Farm Westerns
8	Punjab American	17	Bijapur
9	Kadi Viramgam	18	Upland

Cottons received in accordance with the arrangement made with the Millowners' Associations of Bombay and Ahmedabad

BOMBAY

1	Bengals	11	Surat
2	Khandesh	12	Navsari
3	Ujjain	13	Tiruppur Cambodia
4	Mandsaur (Ujjain)	14	Mogiaz
5	Broach	15	African Busoga
6	Hubli Kumpa	16	African Kampala
7	Hubli Upland	17	African Jinja
8	Bailhoogal	18	Farm Westerns
9	Karunganni	19	Mraj
10	Kurnool Cambodia	20	Westerns

AHMEDABAD

1	Jagadia	2	Kadi
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A list of the technological circulars issued on these samples will be found under the head "Publications". Last year it was thought desirable to compile the circulars in the form of a bulletin which should constitute a handy reference book for the users of Indian cottons and should be entitled "Technological Reports on Trade Varieties of Indian Cottons". During the period under review this bulletin was published for the first time and was much appreciated by the public interested in the Indian cottons.

(2) In addition to these tests, the Laboratory continued, as in the past, to receive samples from private mills which were tested on payment of certain fees laid down by the Indian Central Cotton Committee. The scale of fees is given below —

		Rs a
(1)	Fibre or Yarn Test —	
(a)	Mean fibre length	7 8
(b)	Fibre weight per inch	7 8
(c)	Fibre strength	10 0
(d)	Lea test	7 8
(e)	Ballistic test	7 8
(f)	Single thread test	7 8
(g)	Twist	7 8
(2)	Fibre and Blow room Test —	
(a)	Fibre tests as for (a)—(c) above	
(b)	Blow room only	10 0
(c)	Shirley Analyser tests	7 8
(3)	Full Test —	
(a)	Fibre tests as for (a)—(c) above	35 0
	"	50 0
(4)	.	25 0
(5)	Identification of fibre (microscopic test)	15 0
(6)	Percentage of size	7 8
(7)	" grease	7 8
(8)	" free acid	15 0
(9)	Presence of mildew	7 8
(10)	Causes of mildew growth	30 0
(11)	Percentage of immature fibres —	
(a)	In lint or kapas :	10 0
(b)	In yarn or cloth :	15 0
(12)	Wax content —	
(a)	1 Sample	12 8
(b)	2 Samples	22 8
(c)	3 Samples	30 0
(d)	Each additional sample	7 8
(13)	Determination of mechanical injury to fibre ..	10 0
(14)	Tests in addition to the ordinary 3 roller system (per system)	10 0

(15) Cloth Samples —							Rs a.
(a) Actual counts	..	..	.	..	..	15	0
(b) Actual twist	..	..	.	..	..	20	0
(c) Single thread strength	..	..	.	..	..	20	0
(16) Moisture Tests —							
(a) 1 Sample	..	..	.	..	..	5	0
(b) 2 Samples	..			..	..	7	8
(c) 3 Samples	..	..	.	..	..	10	0
(d) 4 Samples	..	..	.	..	..	12	8

During the period under review the number of such samples showed a very considerable increase which is a remarkable proof of the growing appreciation of the work of the Laboratory and the utilisation of its resources by the industry. During this period the Laboratory carried out on behalf of various mills and firms spinning tests on 7 samples, fibre tests on 32 samples, yarn tests on 73 samples, moisture tests on 10 samples, shirley analyser tests on 4 samples and blowroom tests on 1 sample, the total number of samples tested for the industry being 127. When it is remembered that last year the number of such samples was 39, the fourfold increase in one year is a striking illustration of the manner in which the industry is consulting the Laboratory more and more every year in the solution for its problems.

(3) *Effect of different degrees of compression on the spinning quality of cotton* — Following the recommendation of the Technical Sub Committee these two cottons namely, Punjab and Cambodia Co 2 T was placed before the meeting and it was decided that it should be published in the form of a bulletin. This will be done.

(4) *Effect of artificial watering on the spinning quality of cotton* — This investigation has now been brought to a close. The two cottons selected for this purpose were Amraoti and Broach (Palej). The experimental results are now being analysed and a report will be issued in due course.

(5) *Research work on cotton* — The result of the research work in the form of a bulletin has been issued and a summary of the bulletin will be found under the head 'Publications'.

(d) *Technological samples* — These samples are tested and spun at the Laboratory in connection with the various technological investigations which are undertaken here. A brief account will now be given of the more important investigations and the progress made in respect of each.

(1) *Tests with different systems of high draft spinning*—The Laboratory had already published in the past two bulletins on the application of different systems of high draft spinning to Indian cottons. This work has now been extended by using more systems of high draft spinning. Mixings of cottons prepared from Superfine Oomra, Punjab American 4F and Cambodia Co. 2 as well as the pure cottons themselves have been spun on 9 different systems. The results of these tests are now available and are being written up in the form of a technological bulletin which will be published shortly.

(2) *The effect of storage on seed cotton prior to ginning*—Last year a bulletin on this subject was published in the Journal of Textile Institute. The Technological Research Sub Committee, while considering a summary of the results, recommended that these experiments should be extended to a Kathiawar cotton such as Wagad 8 and that the period of storage should also be extended to four months. Accordingly, in the period under review tests embodying these two recommendations of the Technological Research Sub Committee were carried out and a report on the results obtained will be published in due course.

(3) *Lamit spinning tests*—In order to study the effect of inserting different degrees of twists on the strength, evenness, appearance, etc., of yarn spun from Indian cottons an investigation was undertaken on these lines. For this purpose yarns were spun from Superfine Oomra and Punjab American 4F with different twist multipliers ranging from $3\frac{1}{2}$ to $5\frac{1}{2}$. Furthermore, the African cottons A.R. Kampala, A.R. Busoga and A.R. Jinja, received for tests at the Laboratory were also spun with different twist constants. Similarly, the long staple cottons Giza 7 and Sea Island which were used in connection with another investigation were also spun with various twist constants. This investigation is in progress. It is proposed to extend these tests to other cottons in order to make the results and conclusions as comprehensive as possible.

(4) *Effect of different roller settings and twists on the spinning quality of cotton*—The object of these tests was to find out the best scheme of roller setting and twists in the fly frames and roller settings in the ring frame which would give the optimum results for strength, evenness, appearance, etc., of yarns. For this purpose Surat 1027 A.L.F., Punjab American 4F and Cawnpore K 22 cottons were selected and processed with different twists and roller settings in the fly frames and spun with different roller settings in the ring frame. The results of this investigation were published during the period under review in a bulletin a summary of which will be found under the head 'Publications'. In continuation of this work it is now proposed to take one cotton, namely Punjab American 289F, and to spin it from medium, light and heavy card cliver with different schemes of drafts and speeds in the fly frames in order to ascertain the best distribution of drafts and speeds which should give the optimum results for a cotton of this type. This work is in progress.

(5) *Quality of lint in relation to ginning factors*—It is being realised that considerable damage is done to Indian cottons, especially the long staple ones, by defective or improper ginning and that a systematic study of the best ginning conditions for different types of cotton is highly desirable. In view of this, seed cotton of nine standard cottons was ginned in a single roller gin with different settings of the moving knife and in a saw gin with different speeds. The lint, obtained under each specific ginning condition, was spun into suitable counts and the yarns were tested for strength, evenness, neppiness, etc. The results of this investigation were published during the year under review in the form of a bulletin, a summary of which will be found under the head 'Publications'. As a continuation of this investigation, *lapas* of two cottons, namely, Cambodia Co 2 and Karunganni C 7, has been obtained. Moreover, in view of the increasing importance of the long staple cottons it is also proposed to obtain *lapas* of Sind Sea Island. Further tests with these seed cottons, employing a wider range of moving knife setting on a full size double roller gin will be made. It is also intended to study the effect of density of feed on the quality of lint. These tests will be made as soon as opportunity permits.

(6) *Tests on mixtures of Indian cottons and staple fibre*—During the last few years cotton mills in general have been using the newly developed staple fibre in their preparations. In order to find out the suitability of mixing different types of staple fibre with different varieties of Indian cottons tests were undertaken during the period under review on three types of staple fibre which were mixed in different proportions with Cambodia and Jayawant. The pure cottons, the staple fibres and the mixtures were spun into suitable counts and tested for their yarn characteristics. A report containing the results of these tests will be issued very shortly.

(7) *Effect of raising the middle roller on the spinning performance of a cotton*—It was decided by the Indian Central Cotton Committee that if the results of any tests carried out on behalf of a particular mill are found to be of general interest and if the mill agrees to the publication of such results for general information, the ordinary fees chargeable for the work done by the Laboratory should be waived and the results should be published. During the period under review 16 samples of yarn spun from Sindhi cotton were received from a local mill. These yarns were spun with two different middle roller elevations and with light and heavy middle and back rollers. As it was felt that the results of the tests carried on these yarns might interest the mill industry in general, the results were published for the publication of these results. To it and a bulletin containing the results of the tests carried on these yarns during the period under review. A summary of the results will be published under the head 'Publications'.

(8) *Tests on mixtures of Indian cottons*—This investigation forms a part of the programme approved by the Indian Central Cotton Committee. The object of these tests is to find out the relative importance of the various

fibre properties in determining the 'mixing quality' of two cottons. For this purpose tests have hitherto been made on Surat 1027 A L F , Superfine Oomra, Punjab American 289F, Cambodua Co 2, Broach (Palej), Punjab American 4F, Jayawant, Khamgaon, Kampala, Punjab Desi, Raman and Wagad 8. Besides fibre tests, the cottons are mixed according to a plan and the mixtures are spun into suitable counts. This investigation is in progress.

(9) *Effect of humidity on card losses*—The spinning room of the Laboratory is maintained during the dry season at a relative humidity of 60%—65%. During the monsoon, however, the humidity sometimes rises to about 80%, and there is no means available of bringing it down. As it may happen that a sample may be tested under a high humidity in one year and under ordinary medium humidity in the next year, it was regarded desirable to make some tests under these two conditions of humidities in order to find a basis of comparison for the spinning behaviour in general and the card losses in particular. The tests which were carried out for our own guidance gave some interesting results which it is proposed to publish in the form of a leaflet for general information.

II RESEARCH LABORATORY

Fibre Testing Section—It has been stated above that in addition to the samples on which a spinning test is made, small size samples for fibre tests alone are also received at the Laboratory. These samples are tested in the Fibre Testing Section. One noteworthy feature of the year under review is the fact that the East India Cotton Association sent as many as 52 samples for determination of mean fibre length. This represents a very large increase in the number of samples tested by the Laboratory for the Association in any one year, and though in this particular year it may have been due to exceptional circumstances, it does emphasise yet another direction in which the work of the Laboratory has found an immediate and useful application and recognition. The following statement gives the distribution of the small size samples on which fibre tests were carried out at the Laboratory during the period under review—

- 1 *The East India Cotton Association, Ltd., Bombay*—52 samples
- 2 *The Cotton Research Botanist, Parbhani*—17 samples of Caorani strains, 4 samples each of Parbhani strains and Raichur Kumpta and one sample of Kumpta Local
- 3 *Senior Assistant Botanist, Harihur*—4 samples each of Nadam and Cernuum crosses, Arboreum and Herbaceum crosses and Natural cross selections and one sample of CxN 86
- 4 *The Farm Manager, Nandyal*—8 samples of selections

5. *The Cotton Specialist, Coimbatore*—12 samples of irrigation experiments.
6. *The Cotton Breeder, S. Gujarat, Surat*—One sample of Segregate.
7. *The Director, Institute of Plant Industry, Indore*—2 samples of hybrids
8. *The Director of Agriculture, Baroda State, Baroda*—2 samples of 1027 A L.F. cotton
9. *The Cotton Breeder, Broach*—6 samples of F3 back crosses, 4 samples of B D 8 and Gogharai crosses and 1 sample of New Selection 49.
10. *Senior Cotton Asst., Guntur*—5 samples of strains
11. *D R Vakharia Esq., Broach*—1 sample of Dakor Farm cotton

It will be seen from the above statement that during the period under review fibre tests were made on 133 samples, the corresponding figure for last year being 59. Thus, in the current year the number of samples increased by nearly 2½ times as compared with the last year.

As might be expected, the Fibre Testing Section was kept fully occupied in making the tests on the samples mentioned above as well as on those on which spinning tests were made.

Mr. R. S. Koshal

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cottons and the peak values of strength are attained at lower twists for the shorter than for the longer cottons. It is also found that the left-handed twist has a greater effect than the right-handed twist of an equal amount. The rate of twist increases rapidly for the shorter cottons but that the direction of twist does not make any difference to the percentage contraction. Detailed results of this investigation will, it is hoped, be soon published in the form of a Technological Bulletin.

Physics Section—*Mr. R. S. Koshal* continued his analysis on the effect of distribution of rainfall and temperature on the fibre properties and

spinning quality of cotton. During the period under review an analysis of the following cottons was completed —

<i>Madras</i>	<i>Nandyal</i>
	<i>Karungannu C 7</i>
	<i>Hagari 1</i>
<i>United Provinces</i>	<i>C A 9</i>
<i>Central Provinces</i>	<i>Verum 262 (Nagpur)</i>
	<i>Verum 262 (Akola)</i>
<i>Bombay</i>	<i>Surat 1027 A L F</i>

The other cottons for which the data are available and are being analysed are Wagad 5, Jayawant and Gadag 1. In view of the great importance of this subject to cotton growers and the very interesting results which have already been obtained, it is proposed to place this subject on the agenda of the First Conference of Research Workers on Cotton which is expected to be held after the next cold weather meeting of the Committee.

Mr C Nanjundayya was engaged for part of the period under review for writing up a description of the stapling apparatus which was designed at the Laboratory sometime ago. A bulletin describing the construction and use of this apparatus and containing a summary of the results obtained with it, has been sent for publication in the Journal of the Textile Institute, Manchester. During the remainder of the period, Mr Nanjundayya continued his investigation on the relationship between the fibre properties and the breaking strength and extension of yarn. This investigation forms a part of the programme of work approved by the Committee and is in progress.

Dr K R Sen continued with his investigation on the relative importance of the various fibre properties in determining the mixing quality of Indian cottons. This investigation also forms a part of the programme of work approved by the Committee and is in progress.

Microscopy Section — *Mr A N Gulati* has continued with his investigation on the effect of heredity, environment, irrigation, rainfall, etc on the maturity of cotton fibre. It was found that very suitable material for this investigation was available from the various farms affiliated to the Instituto de Plant Industry, Indore. The Director of the Institute very kindly agreed to supply small samples for the purpose of this investigation. The investigation, however, had to be temporarily suspended owing to the illness of Mr Gulati which necessitated his absence from the Laboratory for 2½ months.

It will be remembered that an investigation was completed at the Laboratory sometime ago on the relationship between the maturity of cotton fibre and the neppiness of yarn spun from it. In this investigation the method employed for the determination of maturity in cotton fibre, though accurate, was found to be rather slow and tedious. During the period under review an attempt was made to improve this method so that a larger number of tests could be carried out in a much shorter time. This attempt proved successful and a new type of slide, which could be easily fitted on the stage of standard microscope, was designed at the Laboratory. The use of this slide made the work of mounting and counting fibres much less irksome than in the past, and the maturity percentage determination could be made much more quickly without any loss in accuracy of results. A short note describing this new device was sent up for publication to the Journal of the Textile Institute and appeared in the April 1936 issue of the Journal. Several of these slides, manufactured at the Laboratory, have been supplied to the Technological Assistants working in the mofussil laboratories.

Mr Gulati also made observations on a new type of progressive damage to cotton fibre by micro organisms. An account of it was published in the Indian Journal of Agricultural Science and a summary of it will be found under the head 'Publications'.

Chemistry Section—Mr D L Sen remained on study leave during the period under review. He is at present working under Prof Scholefield at the College of Technology, Manchester, and is due to return on the 20th September 1936.

Dr Laiji Thoria continued his work on the determination of the cellulose content of different varieties of Indian cottons. The results obtained by him upto November 1935 were considered by the Technological Research Sub Committee and it was decided that these tests should be made on such short staple cottons as are capable of giving, by virtue of possessing a high yield and high ginning percentage, a large output of cellulose per acre. The Directors of Agriculture of the various Provinces and Indian States were requested to ask their cotton breeders to send samples of such high yielding short staple varieties. In response to this request 40 samples were received out of which tests were made on nearly 30 samples. In addition to the testing of these samples, Dr Thoria has also made tests with a view to finding out if certain modifications in the treatment given to cotton would result either in a substantial improvement in the quality of the films made from it or an appreciable reduction in the cost of the treatment. During the period under review Dr Thoria brought the first investigation to a close and also did a certain amount of preliminary work with regard to the second investigation. An account of these two investigations will be published in due course.

Mr G Rama Rao was appointed Research Scholar on the 20th January 1936 and after the customary training in the determination of physical and

chemical properties of cotton fibre was put on an investigation on the absorption of dyes by Indian cottons at the point where it was left by Mr D L Sen. Mr Sen in his work had used a method of adding the dye solution to the cotton until the saturation point was reached. Since this method was not only slow but was also subject to personal errors of judgment, a new colorimeter, which employs the photo electric cell, has been designed at the Laboratory in which the amount of dye left over in the solution is accurately measured. During the greater part of the period covered by this report, Mr Rama Rao was engaged in erecting and calibrating this new apparatus. The remainder of the period was utilised by him to the examination of the absorption of certain well known dyes by some of the standard cottons.

Mr Rama Rao also assisted me in completing an apparatus for recording the direction of wind. A request for an apparatus of this type was made by the Cotton Research Botanist, Lyallpur, sometime ago, who stated that he required it in his work on the study of the effect of wind on cotton crop. This apparatus was designed and completed during the period under review and supplied to the Cotton Research Botanist, Lyallpur.

Mr M U Parmar who was the second Research Scholar selected in the course of this year joined the Laboratory on the 16th January 1936. He was also given the customary training in the methods of fibre and yarn tests. After he received this training, he was entrusted with the investigation on the effect of kier boil treatment on the yarn properties and fibre structure of cotton. The cottons selected for this purpose are Punjab American 289F, Surat 1027 A LF, and Jayawant. Samples of yarn spun from each of these cottons were given different kier boil treatment in the Department of Chemical Technology, University of Bombay. These samples are being tested for strength, extension and chemical damage at the Laboratory, while according to the present arrangement the lustre test will be made by the Department of Chemical Technology.

Mr Parmar also made a number of tests in connection with the investigation on the effect of raising the middle roller setting to which a reference has been made under the head "Technological Samples".

III MOISTURE TESTING SECTION

In the absence of Mr D L Sen, on study leave, Mr P S Sambamurthy, carried out the work of this Section. During the period under review, 24 samples were tested for moisture as follows —

Appeal Committee	2
Trade	11
Laboratory	11

The total number of samples tested at this Section upto 31st August 1936 is 771.

It will be remembered that an investigation was completed at the Laboratory sometime ago on the relationship between the maturity of cotton fibre and the neppiness of yarn spun from it. In this investigation the method employed for the determination of maturity in cotton fibre, though accurate, was found to be rather slow and tedious. During the period under review an attempt was made to improve this method so that a larger number of tests could be carried out in a much shorter time. This attempt proved successful and a new type of slide, which could be easily fitted on the stage of standard microscope, was designed at the Laboratory. The use of this slide made the work of mounting and counting fibres much less irksome than in the past, and the maturity percentage determination could be made much more quickly without any loss in accuracy of results. A short note describing this new device was sent up for publication to the Journal of the Textile Institute and appeared in the April 1936 issue of the Journal. Several of these slides, manufactured at the Laboratory, have been supplied to the Technological Assistants working in the mofussil laboratories.

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Trade	11
Laboratory	11

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IV PUBLICATIONS

The Brochure entitled "Cotton Research in India" was published in accordance with the recommendation of the Technological Research Sub Committee during the period under review. I am glad to be in a position to say that this Brochure was very well received by the Presses, the research organisations and the trade and industry connected with cotton. I give below a few of the extracts from the reviews and letters relating to this Brochure.

Textile Manufacturer—"The Indian Central Cotton Committee though it has—together with the Indian Agricultural Department—great things to its credit, has too many huge problems in front of it to feel much satisfaction, but it can look to its Technological Laboratory at Matunga with pride . . . It was a pioneer Institute for in the actual establishment of a Cotton Spinning Laboratory it was in advance of the Shirley Institute or the Egyptian Government . . . Collected together, it marks an impressive work of reference. The spinning tests in its next section look both ways, they are tests of cotton on behalf of the breeders and the growers and technological research which serves the users and thus encourage the proper use of and appreciation of the improved Indian cottons . . . There is incidental research work which is of great interest and value directly to the cotton spinner."

International Cotton Bulletin—"Dr Nazir Ahmad and the Indian Central Cotton Committee are to be congratulated upon the production of a work of exceptional interest"

A Mill—"On going through, we find the book very useful and we appreciate the work of the Laboratory"

Consul General for Belgium—"I have sent the same to the Belgian Ministry for Colonies, who, I feel assured, will find this documentation interesting and helpful for their research work in Africa"

Royal Afghan Consulate—"I congratulate you on this valuable publication and the success that your Laboratory has attained and the services that it is rendering under your leadership to the most important industry in India"

Prof F. Scholefield—"Thank you very much for the copy you have sent me of your very interesting report on cotton research in India"

' I have not yet had the opportunity of looking through it, but a mere glance is sufficient to show the great interest of the work, and I ask you to accept my best thanks for your kindness in sending a copy to me "

W T Astbury, Esq—"This is to acknowledge with very many thanks the arrival of the copy of your pamphlet on cotton research in India which you so kindly sent me. You may be sure that I am very pleased indeed to have this."

Commissioner, Ministry of Industries, National Government of the Republic of China—"I found that this Brochure is of much interest to this Bureau, and have put it in our library for the public to read."

Russell T Fisher, Esq., The National Association of Cotton Manufacturers, U.S.A.—"I know it will be a valuable addition to the Association Library."

H A Hancock, Esq., Cotton Research Board, Giza, Cairo—"I received your booklet 'Cotton Research in India,' which I have read with very great pleasure, it has not been acknowledged before because I was under the impression that I was reading the Library copy! The volume and the quality of work reflect the great credit on your Laboratory and your Committee's policy of free and open publication make the results of triple value."

In addition to this Brochure, the following publications were issued during the period under review —

I TECHNOLOGICAL BULLETINS, Series A Nos 28 to 34

1 Technological Bulletin, Series A, No 28

"Technological Reports on Standard Indian Cottons, 1935" by Nazir Ahmad, M.Sc., Ph.D., F Inst P

2 Technological Bulletin Series A, No 29

"Technological Reports on Trade Varieties of Indian Cottons, 1935" by Nazir Ahmad, M.Sc., Ph.D., F Inst P

3 Technological Bulletin Series A, No 30

"The Effects of Storing Cotton Bales in the open and inside a shed at Karachi" by Nazir Ahmad, M.Sc., Ph.D., F Inst P

4 Technological Bulletin Series A, No 31

"Quality of Lint in Relation to Ginning Factors" by Nazir Ahmad, M.Sc., Ph.D., F Inst P

5 Technological Bulletin Series A, No 32

"The Effect of Employing Different Roller Settings and Twists on the Spinning Performance of three Indian Cottons" by Nazir Ahmad, M.Sc., Ph.D., F Inst P and R P Richardson, F.T.I.

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idhi Cotton" by Nazir

Ahmad M Sc , Ph D , F Inst P

II TECHNOLOGICAL BULLETIN, Series B No 21

The Average
Sir Ahmad,
M.Sc

III MISCELLANEOUS PUBLICATIONS

- 1 "A Device for Mounting Cotton Hairs for Examination of Fibro Maturity" by N Ahmad, MSc, PhD, F Inst P and A N Gulati, MSc
- 2 "A Note on a New Type of Progressive Damage to the Structure of Cotton Hair caused by Micro organisms" by A N Gulati, MSc

IV TECHNOLOGICAL LEAFLETS

1 Technological Leaflet No. 5, entitled
'The Influence of Method of Picking on the Quality of
Cambodia Cotton'

V TECHNOLOGICAL CIRCULARS Nos 108 to 257, as under —

Circular No	Title	Date of publication
196	Spinning Test Report (No 624) on samples of Dholleras cotton 1934 35	September 1935
197	Spinning Test Report (No 626) on samples of Westerns cotton 1934 35	September 1935
198	Spinning Test Report (No 627) on samples of Surat Cotton 1934 35	September 1935
199	Spinning Test Report (No 628) on samples of Tunnevelly Cotton 1934 35	September 1935
200	Spinning Test Report (No 630) on samples of Cambodia Cotton 1934 35	September 1935
201	Spinning Test Report (No 631) on samples of Karun ganni Cotton 1934 35	September 1935
202	Spinning Test Report (No 633) on samples of Bujapur Cotton, 1934 35	September 1935

Circular No	Title	Date of publication
203	Spinning Test Report (No 634) on samples of Bagalkote Cotton 1934 35	September 1935.
204	Spinning Test Report (No 635) on samples A R Jinja Cotton 1934 35	September 1935.
205	Spinning Test Report (No 637) on samples of A R Busoga Cotton 1934 35	September 1935.
206	Spinning Test Report (No 638) on samples of A R Kampala 1934 35	September 1935.
207	Spinning Test Report (No 640) on samples of Kumpata Cotton 1934 35	September 1935
208	Technological Report on Punjab American 289F, 1935 36	December 1935
209	Spinning Test Report (No 645) on samples of Ujjain Cotton 1935 36	January 1936
210	Spinning Test Report (No 666) on samples of Bengal Cotton 1935 36	January 1936
211	Spinning Test Report (No 667) on samples of Khandesh Cotton 1935 36	January 1936
212	Spinning Test Report (No 670) on samples of Mogalsi Cotton 1935 36	January 1936
213	Spinning Test Report (No 680) on samples of Ujjain (Mandsaur) Cotton 1935 36	January 1936
214	" " " "	February 1936
215	" " " "	February 1936
216	" " " "	February 1936
217	" " " "	February 1936
218	" " " "	February 1936
219	" " " "	February 1936
220	" " " "	February 1936
221	" " " "	March 1936
222	Spinning Test Report (No 696) on samples of Latur Cotton 1935 36	March 1936
223	Spinning Test Report (No 697) on samples of Punjab American Cotton 1935 36	March 1936
224	Spinning Test Report (No 700) on samples of Muttia Cotton 1935 36	March 1936
225	Technological Report on Cambodia Co 2 (Cambodia 440) 1935 36	March 1936
226	Spinning Test Report (No 703) on samples of Navsari Cotton 1935 36	April 1936
227	Spinning Test Report (No 704) on samples of Surat Cotton 1935 36	April 1936
228	Spinning Test Report (No 705) on samples of Balhongal Cotton 1935 36	April 1936
229	Spinning Test Report (No 706) on samples of Tirupur	April 1936
230	" " " "	April 1936
231	" " " "	April 1936
232	" " " "	April 1936
233	" " " "	April 1936
234	Spinning Test Report (No 710) on samples of Habb Kumpata Cotton 1935 36	May 1936

Circular No	Title	Date of publication
235	Spinning Test Report (No 711) on samples of Ilubhi Upland Cotton 1935 36	May 1936
236	Spinning Test Report (No 712) on samples of Navari Cotton 1935 36	May 1936
237	Spinning Test Report (No 713) on samples of Surat Cotton 1935 36	May 1936
238	Spinning Test Report (No 714) on samples of Jagada Cotton 1935 36	May 1936
239	Spinning Test Report (No 715) on samples of Kali Cotton 1935 36	May 1936
240	Technological Report on Surat 1027 A L F 1935 36	May 1936
241	Spinning Test Report (No 716) on samples of Dholleras Cotton 1935 36	June 1936
242	Spinning Test Report (No 728) on samples of Broach Cotton 1935 36	July 1936
243	Spinning Test Report (No 729) on samples of Jagadia Cotton 1935 36	July 1936
244	Spinning Test Report (No 730) on samples of Berar Cotton 1935 36	July 1936
245	Spinning Test Report (No 733) on samples of African Busoga Cotton 1935 36	July 1936
246	Spinning Test Report (No 734) on samples of Jinja Cotton 1935 36	July 1936
247	Spinning Test Report (No 735) on samples of Khandesh Cotton 1935 36	July 1936
248	Spinning Test Report (No 736) on samples of Kampala Cotton 1935 36	July 1936
249	Spinning Test Report (No 739) on samples of Miraj Cotton 1935 36	July 1936
250	Spinning Test Report (No 740) on samples of Tiruppur Cambodia Cotton 1935 36	July 1936
251	Spinning Test Report (No 742) on samples of Karunganna Cotton 1935 36	July 1936
252	Spinning Test Report (No 743) on samples of Northern Cambodia Cotton 1935 36	July 1936
253	Spinning Test Report (No 754) on samples of Farm Westerns Cotton 1935 36	August 1936
254	Spinning Test Report (No 755) on samples of Upland Cotton 1935 36	August 1936
255	Spinning Test Report (No 756) on samples of Kadi Viramgam Cotton 1935 36	August 1936
256	Spinning Test Report (No 757) on samples of Bijapur Cotton 1935 36	August 1936
257	Spinning Test Report (No 758) on samples of Kalagin Cotton 1935 36	August 1936

Summaries of the Publications issued during the period under review are given below —

(1) *Technological Bulletin Series A, No 30 'The Effects of Storing Cotton Bales in the Open and Inside a Shed at Karachi'* —This report contains an account of the investigation carried out to find (1) the extent of the deterioration occurring in the bales kept in the thole yard in Karachi

taking for purposes of comparison similar bales stored for the same period of time in a shed and (ii) whether the expenditure for erecting godowns in Karachi would be justified by the better results and prices obtained for the bales stored in these godowns. This investigation was extended to the three varieties (1) Punjab American (2) Punjab Deshi and (3) Sind Deshi which form the bulk of the trade cotton received at Karachi. Six bales of each variety were obtained out of which three were placed in the thele yard, and the other three inside a shed. At the commencement of the experiment, the top hoop of each bale was broken and a representative sample weighing 20 lbs was drawn from several layers. This was tested in duplicate lots and formed the basis of comparison for the samples drawn on subsequent occasions. The bales were then repressed by hand and stored for six months after which representative samples were drawn from one bale of each variety in the shed and the thele yard. This process was repeated after 12 months and 18 months' storage, the samples being tested similarly on each occasion. Out of these, the initial tests and those obtained after 12 months' storage referred to early part of the year before the rainy season, while the other two sets referred to the latter part of the year soon after the rainy season. The following conclusions were drawn from the results of these tests —

1 Fibre Properties —The fibre results showed that storage of these cottons for periods extending upto 18 months had no appreciable effect either upon their mean fibre length or mean fibre weight per inch. There was, moreover, no indication of any differential response either in respect of the manner of storage (thele yard or godown) or in regard to the variety of cotton.

2 Yarn Strength —As against the fibre tests, the yarn results showed a significant change in the spinning quality of these cottons depending upon the manner of storage. Furthermore, the three types of cotton responded differently to the action of time and the condition of storage.

(i) It was found that if bales of these cottons are stored for some time, either in the thele yard or in the shed, stronger yarns are obtained, which is due to the atmospheric conditions of humidity and temperature. It should, however, be emphasised that this improvement takes place only in yarn strength and is offset to a certain extent by the gradual discolouration and loss of bloom of the stored cotton.

(ii) Keeping the bales in the open in the thele yard has a very definite harmful effect upon the spinning quality of these cottons, this effect being most pronounced with Punjab Deshi, less so with Sind Deshi and least of all with Punjab American. It should also be stressed that these results do not take into account the loss in colour, bloom, etc., which is over and above that sustained by the cotton in its spinning performance.

3 *Grader's Valuation*—Both bodies of experts, the Appeal Committee of the East India Cotton Association and the Board of the Karachi Cotton Association, agree that for each type of cotton the bales stacked in the thole yard would fetch a lower price than those stored inside a shed, thereby resulting in financial loss to the merchant, which may amount to several lakhs of rupees.

(2) *Technological Bulletin, Series A, No. 31—"Quality of Lint in Relation to Ginning Factors"*—The Bulletin describes the results of ginning tests on 9 Indian cottons, ranging in staple length from 0.70" to 0.94" and in mean fibre weight per inch from 0.109×10^{-6} oz to 0.269×10^{-6} oz. Each cotton was divided into four lots, two lots were passed through a saw gin with saw speeds of 325 r.p.m. and 425 r.p.m., the other two lots were passed through a roller gin, the overlaps for the shorter cottons being $\frac{1}{8}$ " and $\frac{1}{4}$ " and those for the comparatively longer cottons $\frac{1}{4}$ " and $\frac{1}{2}$ ". Each lot was tested for mean fibre length and spun into two or three suitable counts, the yarns obtained being examined for breaking strength and neppiness. The mean fibre weight per inch of each sample was determined and fibre strength tests were made on the different lots of four cottons. From the experimental results the following conclusions are drawn—

1 The comparatively longer cottons gave a much higher out turn with the larger than with the smaller overlap. The difference between the out turns with the two overlaps diminished with the staple length of the cotton, and with the shortest cotton a higher out turn was obtained with the smaller overlap.

The higher saw speed gave a significantly higher out turn in the case of all cottons except one. The difference between the out turns with the two speeds was independent of the staple length of the cotton, but the various cottons showed a differential response in this respect.

2 For a majority of these cottons the greater overlap gave higher ginning percentage. However for cottons possessing a mean fibre weight of nearly 0.150×10^{-6} oz per inch, the reverse was found to be the case. The use of either of the two saw speeds did not make any appreciable difference to the ginning percentage in most cases.

3 For the short and medium staple Indian Cottons, an overlap of $\frac{1}{8}$ " was found to be quite sufficient, while for the comparatively longer types, better fibre results were obtained with an overlap of $\frac{1}{4}$ ". The lower speed was found to be more beneficial from the point of view of staple length of the ginned cotton, especially in the case of the comparatively longer types.

4 The values of the fibre strength of these cottons were unaffected either by the overlaps or the speeds employed in these tests.

5 The smaller of the two overlaps in the roller gin and the lower speed in the saw gin effected, on the whole, a greater degree of cleanliness, thereby giving rise to somewhat smaller waste losses in the blow room

6 The differences between the card losses of the various lots of each cotton were insignificant

7 The number of yarn breakages in the ring frame were, on the whole, found to be fewer, with the smaller than with the greater overlap and with the higher than with the lower speed

8 On the whole, the lots ginned with the smaller overlap in the roller gin and the lower speed in the saw gin gave stronger yarns than the corresponding lots ginned with the greater overlap and the higher speed. This general statement, however, should be supplemented in each case by studying the individual response of the cottons to overlaps and speeds for which detailed results are given in the bulletin

9 The width of the overlap in the roller gin and the speed of saws in the saw gin, within the range employed in these tests, did not make any appreciable difference to the degree of yarn neppiness in the case of a majority of these cottons

(3) *Technological Bulletin, Series A, No. 32 — "The Effect of Employing Different Roller Settings and Twists on the Spinning Performance of three Indian Cottons"*—The object of the tests described in this bulletin was to study the effect on the spinning performance of Indian cottons of using different twists in the fly frames and roller settings in the ring frame. For this purpose three Indian cottons, namely, K 22, P.A 4F and Surat 1027 A L F were selected, the first being short and coarse, the second short but relatively fine and the third possessing a staple of medium length. The settings and twists normally employed at the Laboratory were taken as standard and these were varied on either side within the practical range.

The mean fibre length and the fibre weight per inch of each of the three cottons were determined. Each cotton was processed with the different settings and twists and spun into suitable counts. The yarns obtained were examined for loss breaking strength, single thread strength, evenness, number of neps per yard, etc. The number of yarn breakages sustained by each doffing during the spinning process was recorded.

From the experimental data the following conclusions are drawn.—

1 The two short staple cottons registered fewer yarn breakages in the ring frame with $\frac{1}{2}^{\text{nd}}$ than with $\frac{1}{4}^{\text{th}}$ front roller setting. Among these the finer cotton responded better to the change in settings than the coarser one.

2 The effect on the number of yarn breakages of changes in the settings of the other frames was either small or anomalous. It was clear that these effects were being masked by other factors, pointing to the desirability of further work.

3 Compared to the normal setting of the Laboratory, a closer front roller setting ($1/16$ " gauge) in the ring frame was decidedly beneficial to the strength of the resultant yarns with the two short stapled cottons, but was of doubtful value with the medium stapled cotton.

4 By using closer settings in the ring frame with reduced twist, the improvement was more pronounced.

5 As against this, closer settings and reduced twist in the three fly frames effected no change in the yarn strength of K 22, a very small improvement in that of P A 4F, and a reduction in that of Surat 1027 A L F.

6 Thus, on the whole, closer front roller settings in the roving and the ring frame are definitely advantageous with a short and coarse cotton like K 22, somewhat less so with a short but fine cotton like P A 4F, and of doubtful advantage with medium staple cotton like Surat 1027 A L F.

7 In order of merit the front roller set
it is mad
fly frames

8 The effect of opening the front rollers on yarn strength is in the opposite direction to that of closer settings. With this change, the yarns, on the whole, are found to be weaker. As would be expected, wider settings are employed, what less so when the change is confined to the ring frame, and least of all when these alterations in settings are made in the fly frames.

"The Effect of Raising the Strength of Sindh Cotton"

The object of ascertaining the influence of the following factors on the height of the top roller was tested for strength with the following results:

- (i) the weight of the top roller. For (i), the top roller was raised by means of specially constrained roller stands so that its top surface stood respectively $1/32$ " and $2/32$ " above the tangent to the first and third rollers. For (ii), the weights of the top middle roller employed in these tests were 5 oz., 4 oz.,

3 oz, and 2 oz. For (m), the weights of the top back rollers used were 2½ lbs and 3½ lbs, respectively. The following conclusions are drawn from the results —

I The effect of raising the middle roller from 1/32" to 2/32"

(i) The breaking strength of the yarns spun with 2/32" middle roller elevation lies between 75 to 80 lbs, while that of the yarns for which the rollers were lifted by only 1/32" is only about 65 lbs. Thus, by a small change in elevation of the middle roller, an improvement of 10-15 lbs in test was obtained. This improvement is attributed to the better control exerted over the fibres when they are made to adopt a curved instead of a straight path in their passage through the rollers.

(ii) The best strength results were obtained when the ordinary top back roller was used in combination with 2/32" middle roller elevation, while the heavy back roller in combination with 1/32" middle roller elevation gave the poorest results.

(iii) The average difference in yarn strength on elevating the middle roller from 1/32" to 2/32" became progressively less as the weight of the middle roller was reduced showing that the combination of the lighter top middle rollers with 2/32" elevation gave, on the whole, stronger yarns.

Both the interactions (ii) and (iii) show that a rigid control of the fibres as represented by a heavy hack or middle roller is likely to give weaker yarns than relatively elastic control exerted by a comparatively lighter back or top middle roller.

II The effect of using middle top rollers of different weights varying from 5 oz to 2 oz With 2/32" middle roller elevation, the use of the com paratively ^ 5 oz one affected the yarn strength or ^ the weight of the top back roller Bu ^ the use of the lighter middle rollers gave an increase in the yarn strength regardless of the weight of the top hack roller.

III The effects of using ordinary or the heavy back roller —

the heavy back roller is, crease being greater with vation. It appears as if up of the bottom middle effect of using a heavy

hack roller

(ii) The adverse effect of using the heavy hack roller becomes pro gressively less as the weight of the top middle roller is reduced, the only exception to the rule being the lightest of the four rollers weighing only 2 oz for which there is a reversal of the effect.

(5) *Technological Bulletin Series B, No 21 "A New Method and Apparatus for Determining the Average Length and Fineness of Cotton Hairs"*—A review of the previous work done on the relationship between the fibre properties and the spinning value of a cotton indicates that the two properties which contribute mostly to the spinning quality are the mean length and the weight per unit length. Consequently, rapid and accurate methods of determining these two properties should be of immense value not only to the cotton breeder, but also to the trade and Industry. Several methods which are in vogue are briefly reviewed, of these the weight ratio methods are examined in greater detail in the present paper.

It is shown that the prevalent weight ratio methods involve the assumption that the variation of weight along the length of a fibre is negligible. This assumption has been found to be invalid by the recent work carried out by [unclear] shown that if this wrong assumption is made, the weight ratio method gives a wrong result.

A new method, which remedies the above defect, is described in this paper. The essential features of this method consist in cutting a representative tuft of fibres, with one end in alignment, into three parts, the first part extending over a length of T_1 , the second part over a length of T_2 and the third part over a length of T_3 . The average length of the whole tuft is obtained by adding up the individual lengths of the three parts. Furthermore, the fibre weight per unit length may also be determined by counting the number of fibres in the first section prior to weighing and dividing the weight of the tuft by the number of fibres and the average length.

(6) *Miscellaneous Publication—"A Device for Mounting Cotton Hairs for Examination of Fibre Maturity"*—This note describes a microscopical device which facilitates the examination of the maturity of cotton hairs.

(7) *Miscellaneous Publication—"A Note on a New Type of Progressive Damage to the Structure of Cotton Hair caused by Micro organisms"*—While investigating the causes of deterioration of Broach Cotton, a type of damage to the structure of cotton fibre was discovered which does not appear to

have been described by the earlier workers. The chief characteristics of this damage are that (1) it commences from the usual seat of organismal infection, i.e., the basal end or a tear in any other part of the fibre, and (2) it slowly progresses internally disintegrating and corroding the cell wall, leaving intact merely cuticular sheath. The cell-wall gradually tapers from the unaffected portion into the affected one. Nine photo micrographs are reproduced in support of the observation.

(8) *Technological Leaflet No 5 "The Influence of Method of Picking on the Quality of Cambodia Cotton"*—Two samples of Cambodia cotton, grown in Salem (Madras Presidency), from the same seed and under as nearly identical conditions as possible, were tested at the Laboratory. One sample was picked according to the method commonly employed by the local cultivators while the other sample was picked according to the improved method recommended by the Madras Agricultural Department. In the former method the coolies are allowed twice a week usually, to collect the seed cotton in gunny bags, regardless of whether they are fully ripe or immature. In the improved method, the cultivators are advised to pick the kapas only from the fully opened and mature bolls and to leave the locules in the plant itself. This method is not only cheaper and less wasteful than the old one followed by the cultivators, but also yields lint of better quality. The results of the tests carried out on these two samples showed that the sample picked according to the method recommended by the Agricultural Department was superior to the other sample in every respect. It contained a higher percentage of mature fibres, gave 3 per cent less total loss in the opening and cleaning processes, registered fewer breakages in the ring frame and the yarns spun from it were definitely stronger and less nappy than those given by the sample picked according to the cultivator's method. Thus, the cotton picked by the improved method, had gained both in grade and quality and the agriculturists would stand to gain materially by following the method recommended by the Department.

V GENERAL

Visitors—His Excellency the Governor of Bomhay very kindly paid a visit to the Laboratory on 6th April 1936. He was received at the Laboratory by Sir Purshotamdas Thakurdas, Mr Rama Reddi and the writer, who conducted him round the various sections of the Laboratory and showed him the work which was being done in each section. His Excellency evinced very great interest in the work of the Laboratory and put numerous questions regarding the condition of the Indian cottons in
 's to it in particular
 about three quarter
 actually lasted for an
 hour and a half after which he was pleased to express his appreciation of the
 work seen by him.

The Hon'ble Kunwar Sir Jagadish Prasad, Kt., C.I.E., O.B.E., Member of the Viceroy's Executive Council in charge of the Education, Health and Lands Department visited the Laboratory on the 10th January 1936

The Hon'ble Chowdhry Sir Mohamed Zafrullah Khan, Kt., Member of the Viceroy's Executive Council in charge of the Department of Commerce and Railways visited the Laboratory on the 23rd July 1936

Among the others who visited the Laboratory during the period under review mention may be made of the following —

- (1) 25 Post graduate students of the Royal Institute of Science, Bombay
- (2) 52 students and 4 teachers of the Agricultural College, Poona
- (3) 16 students of the Government Textile School, Cawnpore
- (4) Fellows of the Academy and Members of the Reception Committee of the Indian Academy of Sciences
- (5) 15 Research Students of the Physics Laboratory of the Dacca University, Ramna
- (6) 19 First Year B.Sc. students of the Allahabad Agricultural Institute, Allahabad
- (7) 27 students of the Baroda Agricultural School, Baroda
- (8) 15 students of the Kala Bhavan Technical Institute, Baroda

The Technological Assistants working at the mofussil laboratories attended the Laboratory with the exception of Mr S Rajaraman, Technological Assistant, Lyallpur, in December 1935 for the Refresher Course and the Conference. The Conference of the Senior Members of the Laboratory and the Technological Assistants took place on the 6th and 7th December 1935.

Staff — Details regarding the technical staff employed in the Laboratory will be found in Appendix XV, while leave and other arrangements made during the period under review are mentioned below.

Mr D. L. Sen proceeded on study leave to join the College of Technology, Manchester, on the 20th September 1935.

Mr Hari Rao proceeded on leave from the 14th April 1936 to 23rd May 1936 and in his absence Mr R. S. Koshal supervised the work of the Fibre Testing Section.

Mr V Venkataraman, Statistician and Personal Assistant, was given leave on medical certificate from the 9th March 1936 to 12th June 1936 during which period his post remained vacant

Mr A N Gulati, Microscopist, was on leave on medical certificate from 15th April 1936 to 1st July 1936

Mr A B Khan Junior Tester resigned his post on 3rd September 1936 to prosecute further studies, and Mr S N Rao was appointed in his place

Mr S Raja Raman, Technological Assistant Lyallpur, completed his training at the Laboratory on the 11th September 1935 and proceeded to Lyallpur to join his duties. Mr K G Deo, who was transferred to Lyallpur to officiate as Technological Assistant, reverted to his substantive post of Junior Tester in the Laboratory

In order to cope with the increase in the work of the fibre and the yarn testing sections provision for four posts of temporary Junior Testers for a period of three months each had been made in the current year's budget. These posts were filled by the appointment of Messrs B N Prabhakar, S M Nawaz J S Deshpande and G Hurry who worked in the Laboratory from the 2nd December 1935 to 1st March 1936

As in the past, two students from outside Messrs S Dinakaran and B V Vora were selected for training at the Laboratory from 2nd December 1935 for a period of six months. Their period of training expired on the 31st May 1936

During the period under review two Research Scholarships were awarded to Messrs G Ram Rau and M U Parmar and they joined duties on the 20th and 16th January 1936 respectively

Mr W D Saleem was appointed Junior Tester to fill up the post rendered vacant due to the resignation of Mr M R Raut

Mr B N Prabhakar was appointed on the 14th April 1936 as Junior Tester to fill up the post rendered vacant due to the resignation of Mr W D Saleem

Mr V Venkataraman continued to hold the temporary post of Personal Assistant in addition to his own duties

Mr H B Joshi continued to be in charge of the Yarn Testing Section

The working hours of the Laboratory were increased by one hour from 15th August 1936

Equipment—During the period under review the following machines and apparatus were added to the equipment of the Laboratory—

(a) *Machines*

- (1) One Shirley Analyser
- (2) One Fractional H P Motor

(b) *Apparatus*

- (1) Leeds and Northrop Galvanometer
- (2) Bosch and Lomb's Euscope with adjustable microscope lamp
- (3) One Protractor eye-piece with adaptor
- (4) Dr J Saxl's Evenness Tester

ACKNOWLEDGMENTS

It gives me pleasure to express my deep sense of gratefulness to the office bearers of the Indian Central Cotton Committee for their unfailing support and valuable suggestions, to Mr Varjavandas Metilal for his kindness in valuing the cotton samples, to the office bearers of the East India Cotton Association and the Millowners' Associations of Bemahay and Ahmedabad for their help in supplying samples of trade varieties. My best thanks are also due to the staff of the Laboratory for their loyal co-operation and many fruitful suggestions which made it possible for me to complete the work described in this report.

NAZIR AHMAD,

Director,

Technological Laboratory

Dated the 24th November 1936

CHAPTER VII.

REPORT OF THE PUBLICITY AND PROPAGANDA OFFICER FOR THE YEAR ENDING 31st AUGUST 1936.

INTRODUCTION

THE Indian Central Cotton Committee's Publicity and Propaganda Department has made steady progress during the period covered by this Report, in interpreting both in India and abroad, the facts of scientific research work carried on. The Department has directed its efforts along two main channels, firstly, wide press publicity both in India and abroad for disseminating knowledge of improvements effected in the quality of Indian cottons, and secondly vigorous field propaganda by the Publicity Officer in person in collaboration with Provincial

could lay its hands on them quickly and easily. In the second group are included propaganda tours in different provinces of India to carry the fruits of experimental work to the grower and other interests concerned.

ANTI-GOGHARI PROPAGANDA.

The notable event during the year under report was a determined drive initiated by the Department of Agriculture, Bombay, with the Committee's active co-operation to eliminate the inferior cotton known as *Goghari* from the Surat tract. This type of cotton has been found to be undesirable not only in itself but also because it is mixed with superior varieties, thereby spoiling the reputation of one of the finest Indian cotton, *Narsar 1027 A L F*. The united efforts of the Department of Agriculture, Bombay and the Indian Central Cotton Committee to eradicate this inferior variety of cotton from the Surat tract met with only partial success. The main factor which stood in the way of complete success was the higher ginning percentage of the inferior variety. The trader encouraged mixing of the two varieties so as to be able to pass off the mixture as genuine *Narsar*.

To put an end to this evil practice of mixing, legislative prohibition for cultivation of *Goghari* was considered the only means. The Bombay Government accordingly brought forward the bill to prohibit the cultivation of *Goghari* cotton and the mixing of such cottons with other cottons, etc., etc., which has since become law.

In the work of securing the support of the members of the Bombay Legislative Council for the measure, the Publicity Department played its part. An illustrated pamphlet, a hand bill and a special article were prepared and distributed to the members at Poona and at the extended session of the Council in Bombay.

A special demonstration was staged in a large shamanai in the compound of the Council Hall at Poona. Samples of 1027 A L F, Gogharis and mixed kapas, i. e. exhibits, etc., prepared at the Committee's Technical Laboratory at Matunga, were placed on view, together with Baer pictures of 1027 A L F, Gogharis and mixture, combed halos of 1027 A L F and Gogharis and photos, charts, graphs, diagrams, pictures, etc., showing the characters and monetary value of the two varieties as well as of their mixture. The demonstration was organised in a manner calculated to please as well as instruct at a time when the session of the Legislative Council was in progress and was acknowledged to be a source of enlightenment and profit to the members representing agricultural, trade and industrial interests.

A similar demonstration, although on a smaller scale, was held at the extended session of the Council in Bombay which finally passed the measure into law.

The *Times of India*, the *Bombay Chronicle* and local vernacular papers evinced great interest in this important measure and published a special article on the subject. The *Times of India* made appreciative editorial comments upon the Publicity Department's unceasing campaign for educating the members of the Council on the urgent need for the measure.

Following on the passage of the Bombay Cotton Control Bill of 1935 and a similar bill penalising Gogharis cotton in Baroda and in pursuance of the decision taken by the Committee at its 32nd meeting to pursue propaganda work against Gogharis in the district of Surat and Navsari Prant, the Publicity Officer devoted a large portion of his time in the preparation of illustrated pamphlets, the anti Goghari poster "Get rid of the weight", placards, etc., to help forward the campaign and extend it to villages. Rightly alert to the much desired elimination of inferior Gogharis the officers of the Agricultural Departments of Bombay and Baroda had before the big drive was launched carried on in the past the educational work in territories south of Nerbudda river, from Ankleshwar to Bihimora, Vyara and Anawali in the Surat district and in the Navsari Prant in the Gaekwar's territory, inducing cultivators to grow the pure 1027 A L F type, in spite of the pioneering attempts of Sir Purshotamdas Thakurdas, Vice President of the Indian Central Cotton Committee, who was the first to stress the need of putting a complete stop to the growing of Gogharis and to seek Government's co-operation in enforcing measures to that effect. But in spite of it, Gogharis assumed alarming proportions in some villages of Jalalpur Taluka and Navsari Prant.

Supplementing the above efforts, the Publicity Officer of the Indian Central Cotton Committee, accompanied by the Cotton Superintendent, Surat, and Cotton Officer, Narsari, and the staff, carried out a campaign of propaganda, visited a large number of centres and villages in the British and Baroda territories, addressed meetings of growers and interviewed ginowners, merchants, commission agents and export firms, to unify the thinking and action, acquainting them with facts about *Goghari*, the disadvantages of mixing the two varieties, the necessity for checking the evil, provisions of the Acts and their basic objects designed to improve the economic condition of the interests concerned by increasing the net return for cotton which was their mainstay and brought them more than 30 lakhs of rupees per year for their output of 1½ lakhs of bales from the cotton tract South of Nerhudda river, the work of the Indian Central Cotton Committee's schemes to improve and develop cottons in Surat and Baroda and their active co-operation in its endeavour to establish the reputation of the Narsari cotton which was highly prized in India and abroad for its fine long staple

clossal
policy,
of the

The most important steps was to plan and get under way far reaching propaganda campaign, designed to reach every grower and ginner of *Goghari* whom it was possible to reach, and to convince them of the advantages of keeping 1027 A L F pure

By giving talks, by issuing literature, displaying posters, distributing placards, and by personal interviews and other available mediums, public opinion in favour of the measures was successfully mobilized which contributed towards better understanding of the concerted action of the Departments of Agriculture and the Indian Central Cotton Committee even in remote villages

The co-operation of the Press to help forward the campaign in the districts was again noteworthy. Interviews to the press correspondents were given and these resulted into the *Times of India* reproducing poster "Get rid of the weight twice with a descriptive note regarding the poster and an account of the work which was being done in Surat and Baroda for the improvement of cotton

The *Gujarati* of Surat and *Sayaji* *Ijaya* an official organ of Baroda State, besides reproducing the poster wrote leading articles in support of the campaign. An account of the activities of the Committee's Publicity and Propaganda Officer in affected areas was also published.

Literature was supplied to the Press and by these means a good press and general publicity was secured

The programme of the campaigns was immediately successful and the response from the interests connected with cotton was very fine and encouraging

EXHIBITIONS

There are no better mediums than exhibitions and fairs in the civilised countries all over the world as the most effective and important means of knowing how far and in what manner the industries and commerce of a nation are able to meet the demands of its life, whether articles manufactured for the use of a people are of a right quality and type.

One such notable exhibition in which the Publicity Department of the Committee participated was the Rural Life Exhibition at Baroda which lasted for two weeks commencing from the 1st January, 1936. This Exhibition was organised in celebration of the Diamond Jubilee of H.H. the Maharaja of Baroda, and represented a true picture of life springs of agricultural, commercial and industrial development made in that part of the country and an object lesson for the systematic dissemination of those facts which are of the greatest value to the producer, the consumer and the distributor.

The exhibition attracted thousands of visitors, farmers, merchants, manufacturers and members of every class of society.

Occupying as it did an extensive maiden, the exhibition was able to accommodate hundreds of stalls. Side by side with the show of the Agricultural Department the stall of the Indian Central Cotton Committee was organized in a striking manner to fulfil a mission of no small significance namely to make known to the public the eminent part the Indian Central Cotton Committee was playing in the agricultural and industrial advancement of the country. A number of cotton exhibits kindly placed at the department's disposal by the Director of the Technological Laboratory, a large number of photos and charts showing the superiority of 1927 A.L.F. cotton over Gogha posters and other publications of the Publicity Department were on view at the exhibition. The Committee's participation was a great success and numerous comments were heard from cotton interests and the general public who thronged the stall, that so noticeable an improvement has

schemes

varieties

proved to be a great educational agency in the dissemination of knowledge

cost

tba

2 All India Industrial Exhibition, Delhi:

A sufficient number of posters, pamphlets and other publications which were considered to be of use in Northern India were sent for use in the exhibition. The Publicity Officer who at the time was engaged in the preparation of propaganda material for Surat and Baroda campaigns was

unable personally to take part in the exhibition. The Secretary of the exhibition in a letter on the usefulness of posters and literature of the department said "The posters were interesting and always there was a big crowd at places where the posters were displayed. The literature also seemed to have effected good results because it contained valuable information and people liked to receive the literature with great interest."

3 The Fair in Rajputann

At the request of the Extension Officer of the Institute of Plant Industry, Indore, Publicity and Propaganda literature and posters of the Publicity Department were supplied for demonstration and distribution purposes at the fair.

Crop Demonstration in Amraoti and Yeotmal

At the request of the Extra Assistant Director of Agriculture, Amraoti, suitable propaganda literature was sent to him for use in connection with the demonstration of improved crops held in Amraoti and Yeotmal districts.

4 Fairs and Demonstration in Warora, Central Provinces

Publications of the Department were also supplied to (1) the Agricultural Assistant, Warora, Central Provinces, and (2) the Deputy Director of Agriculture, Gujarat, in connection with village uplift work in several villages which were visited by H E the Governor of Bombay.

PRESS COMMUNIQUES

The following press communiques were issued during the year under report —

- 1 *Elimination of Goghar cotton from Surat tract*
- 2 *Development of cotton cultivation in Sind*
- 3 *Combing of good quality Indian cottons*
- 4 *Development of cotton growing in Bombay Presidency*
- 5 *Facilities for training at the Technological Laboratory, Matunga*
- 6 *Amalner Cotton Market*
- 7 *Fibre maturity in relation to fibre and yarn characteristics of Indian cottons*
- 8 *The 31st Half yearly meeting of the Indian Central Cotton Committee*
- 9 *The 32nd Half yearly meeting of the Indian Central Cotton Committee*
- 10 *Improved varieties of cotton in Sind and their cultivation*
- 11 *Review of last year's developments*
- 12 *Seed distribution and extension schemes*
- 13 *Improvement of cotton in India*
- 14 *Review of the brochure on cotton research in India*
- 15 *Effects of storing cotton bales in the open and inside a shed at Karachi.*

SPECIAL ARTICLE

Elimination of Goghari cotton from Surat tract — This special article was issued to bring home to the members of the Bombay Legislative Council, the agriculturists in Surat and the trade in general the necessity for the eradication of *Goghari* cotton from the Surat tract, in view of the great damage done to the reputation of the superior variety 1027 *A LF* by the mixing of both the varieties and passing the mixture off as genuine *Naasari* cotton. Legislative intervention was the only means of salvaging the reputation of the *Naasari* cotton.

PAMPHLETS

In addition to
Propaganda Depart-
results of study of
were

, the Publicity and
etc., setting forth
pamphlets issued

I "Elimination of Goghari from the Surat tract will re establish the reputation of Naasari cotton"

This pamphlet explains the superiority in quality and value of *Naasari* 1027 *A LF* cotton as compared with *Goghari*, the disadvantages of mixing these two varieties and the views on the question of those affected by the evil of mixing. This pamphlet was specially prepared in connection with the anti *Goghari* propaganda campaign launched by the department, when the question of elimination of *Goghari* cotton from the Surat tract was before the Bombay Legislative Council.

2 A Gujarati version of this pamphlet was also brought out for propaganda in the Baroda State

3 "Spotted Boll worms (*Earias Faba insulana*) in South Gujarat"

This is a popular thoroughly illust monograph published by the Imperia. This deals with the results of the Surat the investigations made from 1923 to 1934 on the Spotted Boll worm in

efficiency of control measures

4 "The Indian Central Cotton Committee, its objects, activities and achievements"

This pamphlet gives a comprehensive description of the Committee's varied activities and its achievements in the legislation designed to promote the production, marketing and manufacture of India cottons and in the sphere of research.

In order to reach a wider public, this pamphlet was translated from English into the provincial languages such as Marathi, Gujarati, Urdu, Hindi, Tamil and Telugu

5 "Summary Proceedings of the 32nd meeting of the Indian Central Cotton Committee"

This was an impersonal summary setting forth the main points brought out during discussions without mentioning the names of the speakers

6 A handy illustrated pamphlet is under print, setting forth the aims and achievements of the Indian Central Cotton Committee, for distribution during the forthcoming United Provinces Industrial and Agricultural Exhibition at Lucknow

POSTERS

Get Rid of the Weight'

The four coloured poster was specially prepared to help forward the campaign for the elimination of *Goghar* from the Surat and Baroda tracts. It is a vivid picturization of the handicap which *Goghar* constitutes to the cultivators efforts to obtain better prices for his product. It lends point to the exhortation to get rid of the short staple variety of cotton grown in Surat and Baroda which is greatly responsible for the deterioration in the quality of 1027 A L F

The preparation of a suitable poster for B D 8 cotton in Gujarati was also taken in hand

The idea of replacing the poster *India's bid for Supremacy in world's Cotton Markets* with a different attractive design and latest available figures was also taken in hand. To cope with the immediate demand for this poster a number of copies of the old edition was brought up to date and printed

LEAFLETS

The Gujarati leaflet on the uses of plant puller was reprinted a third time to meet increased demand from Baroda and other places

HANDBILLS

1 The Plant Puller handbill was also reprinted a third time in Gujarati in order to meet heavy demand from the Director of Agriculture, Baroda

2 "Save Indian Cottons"

The handbill was prepared in connection with the efforts made by the Publicity and Propaganda Department to eliminate *Goghar*. A Gujarati version, with necessary modifications, was also prepared in connection with a similar campaign proposed to be conducted in Baroda.

PLACARDS

A placard explaining the gist of legislative measures prohibiting the growing of the *Goghar*, and directing the growers to obtain pure seed of 1027 A L F from nearest Government Depots was also prepared in English and Gujarati.

DEMAND FOR PUBLICITY LITERATURE AND GREATER NUMBER OF ENQUIRIES

The year now under review was remarkable for an increased demand for the publications of the Department as well as for special information bearing on the Committee's work. A large number of enquiries from Government institutions, trade associations, private concerns and interested individuals were attended to. Its help was sought for information on scientific investigations, based on the latest knowledge of marketing and other problems in connection with the improvement and export of Indian cotton. These enquiries encouraged the belief that the widening of the informational service has attracted increasing attention from both the trade and the general public, here and abroad.

PUBLICITY OFFICER'S TOURS

During the year under report the Publicity and Propaganda Officer paid visits to Poona, Surat, Baroda and Navsari and toured through many districts of these states with the Anti *Goghar* campaign. He met with cotton interests and endeavoured to bring them towards a better movement of cotton in India and to offer them the services of the Department in this respect. With the help of the Officers of the Department of Agriculture, Bombay and Baroda, the Publicity and Propaganda Officer followed a rationally adjusted working plan for the campaigns that made the most effective success, as reflected in the earlier pages of this report.

APPRECIATION OF COMMITTEE'S WORK

In assessing the value of the Committee's work, several newspapers, both in India and outside, have from time to time written in appreciative terms. For instance, the *Times of India*, commenting on His Excellency

the Governor's address at the 31st half yearly meeting of the Indian Central Cotton Committee in which His Excellency referred to Lancashire's readiness to make more use of Indian cotton, if uniformity in quality was assured, observed as follows

"to this persistent publicity and propaganda are essential, the Indian Committee are awake to this need Its Publicity and Propaganda Department has been instrumental in checking to some extent the evils formerly prevalent in the cotton trade Particularly successful was its campaign for the elimination of the boll-worm pest in Surat, which adversely affected the quality of the local crop Its task will be con

His Excellency the Governor of Bombay
yearly meeting of the Indian Central Cotton
made reference to Publicity and Propaganda
following terms "Through its propaganda agency your Committee with
the immense authority of its store of knowledge and experience wields a
great power for the improvement of the cultivation and trade of this Presi-
dency Bombay is above all the cotton province of India and any improve-
ment in production, marketing or export will benefit a very large section of
the population The difficulty in the way of improvement is very largely
that of convincing growers and traders of the resultant benefits The culti-
vator is naturally conservative it is indeed hardly reasonable to expect him
to display much individual originality and initiative Demonstration and
propaganda are necessary to convince him that it pays in the long run to
spend more on better seed, to root up old cotton stumps and to keep cotton
free from admixture of inferior kinds and of dirt and rubbish The Com-
mittee is admirably equipped for this purpose and has already done much
by bringing home directly to the guilty party any departure from the
specified standard of quality in cotton bales"

R. D. MIHRA,
Publicity and Propaganda Officer

APPENDIX L.

MEMBERS OF THE COMMITTEE

(1) PRESIDENT —

Sir Bryce Burt, Kt., C.I.E., M.B.E., I.A.S., Offg Vice Chairman, Imperial Council of Agricultural Research, ex-officio

(a) The Expert Adviser to the Imperial Council of Agricultural Research in Agricultural matters, ex-officio

(2) REPRESENTATIVES OF AGRICULTURAL DEPARTMENTS—

Madras	M R Ry Rao Bahadur D Ananda Rao Guru, I.A.S
Bombay	The Director of Agriculture
United Provinces	Mr J H Ritchie, I.A.S., Director of Agriculture
Punjab	The Director of Agriculture
Central Provinces	Mr J C McDougall, I.A.S., Director of Agriculture
Burma	Mr F D Odell, I.A.S., Deputy Director of Agriculture, West Central Circle, Magwe

(3) THE DIRECTOR GENERAL OF COMMERCIAL INTELLIGENCE AND STATISTICS

(4) REPRESENTATIVES OF CHAMBERS OF COMMERCE AND ASSOCIATIONS--

The East India Cotton Association	Sir Purshotamdas Thakurdas Kt.
The Bombay Millowners' Association	C.I.E., M.B.E. (<i>Vice President</i>)
" " "	Mr S D Salatvala, M.L.C.
" " "	Mr M S Durutti
" " "	Mr Chandidas Mehta
" " "	Mr A P Darlow
The Tutiocina Chamber of Commerce	Seth Sakaria Balabhai, M.L.C.
The Upper India Chamber of Commerce	Mr J Venesch
The Empire Cotton Growing Corporation	Mr J Tinker
	Mr W Roberts, C.I.E.

(3) AND (6) COMMERCIAL REPRESENTATIVES NOMINATED BY LOCAL GOVERNMENTS—

Central Provinces	{ Mr Y G Deshpande Mr D K Kane
Madras	Mr J Nuttall.
Punjab	Khan Bahadur Sardar Habibullah, M.L.C.
Bengal	Mr Akhil Bandhu Gupta.

(7) CO-OPERATIVE BANKING REQUIREMENTS

Sir Chandidas V. Mehta, K.C.S.I.

(8) REPRESENTATIVES OF COTTON GROWING INDUSTRY—

Madras	{ Mr K S Ramaswami Gownder M R Ry Rao Bahadur B P Sesha Reddi Garu M.L.C
Bombay	{ Sardar Rao Bahadur Bhumbhai Ranchodji Naik, M.L.C Rao Bahadur C S Shirhatti
United Provinces	{ Khan Bahadur Shah Nazar Husain M.L.C Rai Bahadur Lala Anand Sarup M.L.C
Punjab	{ Sardar Sahib Gurbachan Singh M.L.C Mian Nurullah M.L.C
Central Provinces and Berar	{ Rao Bahadur M. G. Deshpande C.B.E (Mr M. P. Kolhe M.L.C)

(9) AND (10) REPRESENTATIVES OF INDIAN STATES—

Hyderabad State	Mr Nizam ud Din Hyder Director of Agriculture
Baroda State	Mr R. G. Allan C.I.E. Commissioner of Agriculture
Gwalior State	Mr H. H. Pandya Director of Agriculture
Rajputana and Central India States	Vacant *

(11) ADDITIONAL MEMBERS NOMINATED BY THE GOVERNOR GENERAL IN COUNCIL—

- 1 Mr D N Mahto Economic Botanist for Cotton Central Provinces
- 2 Rao Bahadur S S Salimath Deputy Director of Agriculture Southern Division Dharwar
- 3 Dr V K Badami Ph.D. Deputy Director Department of Agriculture in Mysore State Bangalore
- 4 Mr R. Ry V Ramanatha Ayyar Avl. Cotton Specialist Coimbatore
- 5 Musahib-i-Khas Bahadur S V Kanungo Finance Minister Holkar State Representative of the Holkar State
- 6 Mr W J Jenkins I.A.S. Chief Agricultural Officer in Sind Karachi
- 7 Seth Isserdae Varindmal Representative of the Karachi Indian Merchants Association
- 8 Mr P B Richards I.A.S. Entomologist to Government United Provinces
- 9 Mr Sayed Miran Muhammad Shah M.A.C. 50 Cantonment Hyderabad Sind
- 10 Khan Sahab Ebrahimkhel Subkhel Mirza Nawabshah Sind
- 11 Lala Shri Ram Representative of the Cotton Millowners of Delhi
- 12 Mr Chellaram Shawaram Representative of the Karachi Cotton Association, Ltd.
- 13 Dewan Bahadur Sir T. Vijayaraghavacharya K.B.E

APPENDIX II.

CONSTITUTION OF SUB COMMITTEES

STANDING FINANCE SUB COMMITTEE

Sir Bryce Burt (<i>ex-officio</i>)	Mr J Vonesch
Sir Purshotamdas Thakurdas (<i>Chairman</i>)	Mr Chunilal B Mehta
Mr S D Saklatvala	Mr A P Darlow
Sardar Rao Bahadur Blumhhai Ran chodji Naik	Sir Chunilal V Mehta
	Mr M S Durutta

LOCAL SUB COMMITTEE

Sir Bryce Burt	Mr J Voneach
S r Purahotamdas Thakurdaas	Mr Chunilal B Mehta
Mr S D Saklatvala	Mr A F Darlow
Sardar Rao Bahadur Bhumbhai Ran chodji Naik.	Sir Chunilal V Mehta
	Mr M S Durruti

COTTON GINNING AND PRESSING Factories Sub Committee

S r Purshotamdas Thakurdas	Mr J Tinker
Mr S D Saklatvala	Mr J Nuttall
Mr J Vonesch	Mr W Roberts
Mr Chunilal B Mehta	Mr Y G Deshpande
	Vacant (two seats)

The Co-operative Banking Representative—Sir Chunlai V Mehta and Mr Chellaram Shewaram—(Co-opted Member)

AGRICULTURAL RESEARCH SUB COMMITTEE

I *The President*—Sir Bryce Burt
 II *The Vice President*—(ex officio)
 III *The Director Institute of Plant Industry*—(ex officio)
 IV *The Co-operative Banking Representative*—Sir Chundal V Mehta (ex officio)
 V *Cotton Growners Representatives*—Mr W Roberts Mian Nurullah Vacant
 (one seat)
 VI *Cotton Trade Representatives*—Mr Chundal B Mehta , Vacant (one seat)
 VII *Agricultural Officers*—Dr W Burns Mr J H Ritchie Mr H R Stewart

 VIII *Co-opted Members.*—Mr Mohammad Afzal Rai Saheb Kabdas Sawhney
 Mr J B Hutchinson Mr Chellaram Shewaram and
 IX *The Secretary*

TECHNOLOGICAL RESEARCH SUB COMMITTEE

The President (<i>Ex-officio</i>)	Mr J Finken
Sir Purshotamdas Thakurdas	Mr M S Durutti
Dr W. Burns	
Mr H R Stewart	Mr Y G Deshpande
Mr Chunilal B Mehta	
Seth Sakarlal Balabhai	Lala Shri Ram
Rao Bahadur D Ananda Rao Garu	Mr N Brodie (<i>Co-opted</i>)
Mr S D Saklatvala	Dr Nazir Ahmad
	Vacant (one seat)
Mr A D Walwyn, Mr Dharamrai Mulraj Khatau (Representing the Bombay Mill-owners' Association)	
Mr Kasturbhai Lalbhai, Seth Chamnial G Parekh (Representing the Ahmedabad Millowners' Association)	
Mr R G Saraiya Mr Jamnedas Ramdas (Representing the East India Cotton Association, Ltd)	
Seth Issardas Varindmal, (Representing the Karachi Cotton Association, Ltd)	

RESEARCH STUDENTS SELECTION SUB COMMITTEE

The President	Mr W J Jenkins
The Vice President	Mr J C McDougall
Dr W Burns	Mr H H Pandya
Mr H R Stewart	Mr Nizam ud Din Hyder
Mr J H Ritchie	
Mr R G Allan	Dr Nazir Ahmad
Mr P B Richards	Dr V K Badami
Rao Bahadur D Ananda Rao Geru	Vacant (two seats)

COTTON FORECAST IMPROVEMENT SUB COMMITTEE

The President	
The Director General of Commercial Intelligence and Statistics Calcutta	
The Director of Agriculture Bombay Presidency	
Do do Punjab	
Do do Madras	
Do do United Provinces	
Do do Central Provinces	

SPECIAL SUB COMMITTEE ON WIDER MARKETS FOR INDIAN COTTON

The President	Mr J. C McDougall.
The Vice President	Khan Bahadur Sardar Habibullah.
Mr H R Stewart	Sardar Rao Bahadur Bhumbhai Ran chodji Naik.
Mr J H Ritchie	Rao Bahadur D Ananda Rao Garu
Dr W Burns.	Mr Nizam ud Din Hyder
Mr S D Saklatvala	Mr W J Jenkins.
Mr J Vonesch	Mr Kasturbhai Lalbhai, Seth Isserdas Varndimal, Mr R G Saraiya, (Co opted)
Mr Chunilal B Mehta	Vacant (one seat)
Mr Y G Deshpande	
Mr W Roberts	

STANDARDS SUB-COMMITTEE.

Mr W Roberts (Representing the Imperial Council of Agricultural Research)
Mr Handas Madhavdas, Mr Varjiwandas Motilal (Representing the East India Cotton Association, Ltd)
Mr A. P Darlow, Mr Kisharam Lekhraj (Representing the Karachi Cotton Association, Ltd.)
Mr N M Deshmukh, Rao Bahadur G R Kothare (Representatives of cotton growers of Berar Tract)
Mr Himatlal Jagiwandas Vadodara, Mr Vadilal Chunilal Doishi, (Representatives of cotton growers of Mathura Tract)
Mr Akhubava Takhatasenghji Chudasama Rao Saheb Kevalbhai Desai, (Representatives of cotton growers of Dhollera Tract)
Mr Haribhai Jhaveribhai Arun, Mr Ardesher Jamabedji Kapadia, (Representatives of cotton growers of Broach Tract)
Sardar C B Naik Bahadur Desai Rao Bahadur B L Patil (Representatives of cotton growers of Kumpeta Tract)

APPENDIX III.

LIST OF RESOLUTIONS

"The Indian Central Cotton Committee notes with great satisfaction the Knighthood conferred on the acting President and tenders its cordial congratulations to Sir Bryce Burt on the high honour conferred on him"

"That the Indian Central Cotton Committee notes with satisfaction the expeditious manner in which the Bombay Cotton Control Act was passed by the Legislative Council. It is confident that this piece of legislation will go a long way towards improving the quality of cotton of the Surat tract where Gogha has been spreading to an alarming extent and that the benefits to the grower expected from the Act will soon be realised"

"That the recommendation of the Standing Finance Sub Committee that the Government of India be requested to make permanent the present fees for the fumigation of American cotton of Rs. 270 per square bale and of Re. 150 per round bale be approved."

"That the Indian Central Cotton Committee congratulates the Bombay Government for the rapid progress they have made with the introduction of the Bombay Cotton Ginning and Pressing Factories (Amendment) Bill in the Bombay Legislative Council"

"The Indian Central Cotton Committee endorses the recommendation of the Local Sub Committee regarding the detailed provisions in the Central Provinces Cotton Ginning and Pressing Factories (Amendment) Bill for dealing with watering excesses seed, introduction of extraneous matter and mixing of different kinds of cotton"

"The Committee resolves that the complaint from Dhulia be reported to the Government of Bombay for effective prevention of this sort of malpractices reported by means of the Bombay Cotton Ginning and Pressing Factories (Amendment) Act"

"The Indian Central Cotton Committee desires to express its very great regret at the sudden and tragic death of Dr F J F Shaw and wishes to convey its most sincere sympathy to Mrs Shaw and her family in their great loss."

"The Indian Central Cotton Committee places on record its satisfaction that the Governments of Bombay and the Central Provinces have passed legislation for the control of cotton ginning and pressing factories. The Committee has no doubt that this measure will go a far way in suppressing the malpractices which are detrimental to

"The Indian Central Cotton Committee urges on the Government of Sind the necessity of taking very early steps to make the Cotton Ginning and Pressing Factories (Bombay Amendment) Act effective in that province by framing rules as early as possible before malpractices become established in the newly developed cotton tracts of that province"

"That the Indian Central Cotton Committee notes with satisfaction the continued efforts of the Lancashire Indian Cotton Committee to extend the use of Indian cotton in Lancashire and trusts that the good work being done by that body will be of mutual advantage to both countries.

1941-1942 - 1943-44 - 1944-45 - 1945-46 - 1946-47 - 1947-48 - Cotton Committee
1948
+ 1949
1950
1951

"The Indian Central Cotton Committee welcomes the action of the United Provinces Government in submitting the United Provinces Cotton Pest Control Act of 1936 to the United Provinces Legislative Council, and records its approval of the Bill.

The Indian Central Cotton Committee records its opinion that the proposed legislation is in the interests of the cotton growers and the cotton trade of the United Provinces and that effect should be given thereto as early as possible."

¹¹ This Committee is of opinion that it is necessary to extend the Cotton Ginning and Pressing Factories (Bombay Amendment) Act to the districts of East and West Khandesh and other tracts particularly in view of the fact that the Central Provinces Government has only recently passed a similar Act.

The Committee also desires to draw the attention of the Government of Bombay that the Bombay Act as at present worded cannot prevent the mixing of cotton waste with cotton and, therefore, requests the Government of Bombay to take in hand the necessary amendment so as to prevent the mixing of cotton waste with cotton.

The Committee also requests the Local Sub Committee to report as to other areas in the Bombay Presidency to which it would be desirable to apply the Act."

APPENDIX IV.

INSTITUTE OF PLANT INDUSTRY, INDORE.

Annual Report for the Year ending June 30th, 1936

The Institute of Plant Industry is a Society registered under the Holkar State Societies Registration Act and its primary objects are —

- (a) The investigation of all matters relating to the production and improvement of raw cotton in India
- (b) The agricultural development of the Indian States which are members of the Society
- (c) The training of officers and cultivators nominated by such States
- (d) The training of advanced students nominated by the Indian Central Cotton Committee

Its funds are derived entirely from subscriptions. In the financial year 1935-36 the Indian Central Cotton Committee made a grant of Rs 97,600 and the member States in Central India and Rajputana subscribed Rs 67,335.

The Institute is subsidised by the Indian Central Cotton Committee primarily in

and Rajputana.

The interests of the member States lie in the investigation of the specific crop problems of their own territory, and in the development and dissemination of better seeds and more efficient agricultural practices.

The interests of the Indian Central Cotton Committee and of the member States are complementary, and provide a very satisfactory balance to the work of the Institute.

The Governing Body of the Institute is representative of the Cotton Committee and the member States, and its President is the Agent to the Governor General in Central India, *ex officio*. The Director of the Institute is also Agricultural Adviser to States in Central India and Rajputana, and in addition represents all those States upon the Indian Central Cotton Committee.

ADMINISTRATIVE AND GENERAL.

I. General and Board of Governors' Meetings—The fourth General Meeting of Members of the Society was held on January 31st, 1936, when discussion took place on

It was decided not
ing the States' reprs
nd Jodhpur, each to

The Board of Governors at its 16th Meeting held on the following day decided that

The report for the year 1937-38 will be submitted at the earliest opportunity.

been lost either by dismissal or resignation in anticipation thereof

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it process

to Ceylon conditions. That a commercial firm should make such voluntary payments is clear proof of the value of this process and of the Institute's co-operation

At the closing date of this report the following twenty five States and Thikanas were members of the Institute, arranged in order of joining —

Indore	Tonk	Orchha
Dhar	Bijawar	Jodhpur
Jaora	Bawali	Alwar
Dantewada	Bikaner	Khetri
Rutjarn	Rawa	Bagh
Dewas (Senior Branch)	Jaipur	Jhabua
Sitamarhi	Bundi	Chittarpur
Narsinghpur	Partabgarh	Sikar and Karauli

11 member States

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Those who are familiar with its record of discovery and application of solutions to the agricultural problems of its member States will testify that the Institute has fully justified its existence. Its members in the past have profited much from the heavy capital outlay and the share of overhead expenses borne by the Indian Central Cotton Committee. It seems probable that circumstances will force that body to reduce its grants still further in the near future and therefore if serious reductions in the Institute's efficiency are to be avoided a much larger measure of financial support must be given by States.

3 Staff and Students—The Geneticist and Botanist was absent on leave and deputation in Europe from 13th July to 6th October 1935, when he led the Government of India delegation to the Imperial Botanical Conference in August and was a member of the delegation to the Sixth International Botanical Congress in Amsterdam in September.

As a result of this absence and of a temporary reduction in staff in the Genetics and Botany Section for two months during the busiest season of the year, the preparation of papers for publication has not been as rapid as it would otherwise have been.

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Two posts of Junior Farm Assistant were abolished, and two of Research Assistant in the Chemistry and Agronomy Section remain vacant for lack of funds, in addition to others.

The uncertainty as to their future which unfortunately prevails in the minds of a number of the research workers in the Institute is not conducive to that steady application and calm atmosphere so essential for good work on intricate problems. What has been done by these workers is therefore all the more creditable.

The personnel of all Sections have worked with a vigour and enthusiasm which is most praiseworthy and which is due, in no small measure to their realization of, and pride in the fact that they are building up an organization which in many ways is unique in India, and which is commanding in an increasing degree the respect and attention of those of much older standing.

That numerous requests are received from highly qualified scientific workers both in India and abroad, to be allowed facilities at the Institute to carry out research work on a voluntary basis is a proof of the Institute's rising reputation. Most of these requests had to be refused, owing to limitations in accommodation and equipment but five such workers have been entertained during the year.

4 Visitors—The Institute received the honour of visits by His Highness the Maharaja Scindia of Gwalior, who devoted several hours to a thorough examination of the work in progress, and Their Highnesses the Maharajah of Dewas (J B) and the Raja of Sajana.

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Among other visitors during the year were the following.—

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New Delhi
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Barwani

Hiralal K Seth, Rai Bahadur, Rajya Bhushan, Managing Director, Rajkumar Mills
Ltd, Indore

Hulkoti R Y, Acting Professor of Agriculture Poona with a party of 53 students
Jasol, Kunwar Amar Singh of, Director of Agriculture and Grass Farms Jodhpur
Rajputana

Kanungo, S V, Finance Minister, Holkar State Indore

Kesarisingh, Chief Member of Council, Kishangarh, Rajputana

Kibe, M V, Sardar, Indore

Nadkarni, M M, Manager, Sayyan Mills, Rutlam

ral

Yelwande, R. C., Revenue Minister, Dewas (J. B.)

5 Library—Accessions during the year were—

Text books and works of reference	41
Complete volumes of journals	140
Reports, bulletins, etc	247

RESEARCH WORK.

This has been done in spite of the fact that the head of the Genetics and Botany Section could not be recruited until the end of August 1933, and of the financial uncertainty in the last two years, which has led to the loss of research staff on whose special training much time and care had been spent.

The revision in research policy introduced in 1932 has borne fruit abundantly. The research staff take great pains to keep abreast of the results of other workers in their subjects, and for this the abstract publications of the Imperial Agricultural Bureaux have been invaluable.

The fullest use is made of modern methods of experimentation and particular mention may be made of the applications of mathematics to the design of field and laboratory experiments, and to the statistical treatment of their results, which probably have been more thoroughly and extensively exploited at the Institute than by any other research organization in India. The statement below shows the extent to which, in field experiments alone, such methods have been utilized.

Randomized, replicated field Experiments

	1932	1933	1934	1935	1936 (kharif)
At Indore	24	82	43	35	56
In States	33	87	142	178	95

The precision and rapidity with which results can be interpreted amply repay the extra trouble involved.

Statistical methods have also been applied with outstanding success to plant breeding problems and the new technique evolved enables degrees of superiority or inferiority to be recognised with accuracy several years sooner than has hitherto been possible. In the laboratory too the degree of accuracy of measurements and analyses can also be determined by similar methods which are in regular use at Indore though not commonly elsewhere.

The willing co-operation of the States and their officers in carrying out field trials sponsored by the Institute remains a feature worthy of much commendation. Owing to this many items are now ripe for propaganda by them.

The Instituto is once again indebted to the Provincial Departments of Agriculture in India for many courtesies and much assistance and it is pleasing to be able to record that repayment in kind becomes increasingly possible. These remarks also apply to Agricultural Departments in the U.S.A., the French Colonies, Russia, Iran and many parts of the Empire.

7. Weather and its effects on Crops—In Malwa the monsoon rainfall was close to the average of many years the Institute recording 30.8 inches from June to September

Malwa monsoon

	1935	1934	1933
Pre monsoon	1.67	0.10	0.60
June	5.97	10.72	10.09
July	12.76	8.08	14.75
August	4.83	21.17	14.44
September	7.24	15.06	10.35
October	1.52		0.01
November	0.34	1.40	0.19
Total	34.33	57.43	51.33

— *in a few cases the weather which affected the early rains*

There was no frost in Central India save in the northern States bordering Rajputana where also there was no very severe damage to crops.

Culture which gave to India the new collections of material from French Africa left certain obscurities in the relationships of the wild and cultivated African types. As it is

solution of the confusion in nomenclature has been referred to a systematic botanist for his opinion. It is hoped that it will be possible to publish in the course of two or three months.

(b) *Botanical Survey*—The work of the Botanical Survey of India in the Nurnar is almost complete. During the last year the work has been greatly extended. In connection with the botanical surveys

tours were undertaken at the times of harvest of the two types of cotton now under cultivation, Matheo and Wagad. The present status and botanical composition of the two crops was elucidated, and selections were made in both. It was established that (1) The range of variation in Wagad is very much greater than in Matheo. This was predicted

Influence by hybridization of primitive or divergent types such as 16021

Investigations into the possibilities of substituting medium for short staple des varieties of cotton have yielded valuable results. The study of old literature has shown that des cottons which would now be classed as medium or long staple were formerly grown in the Nerbudda valley and in parts of Rajputana two areas which are now contributing largely to the embarrassing bulk of India's short staple crop. The invasion of

the des cottons into the delta of the Ganges and do not give their crop before they are imbedded to another invader, a more or less Upland mixture, locally known as Cam mixed lint, but is (in pure culture) a

* Financed by the Indian Central Cotton Committee for the study at Sircangnagar (North Bihar) of neglected cottons of possible utility for the improvement of the coarse cottons of the Bengal tract.

(c) *Genetics*—(i) Further confirmation of Hutchinson's theory of the organization of the gene has been provided by the discovery of at least one more allelomorph in the leaf shape series

(ii) Studies on the fundamental genetic basis of the lint hairs are being carried on and either four or five genes for "lintless" are now known

lamina between veinlets

(iv) The work of interspecific hybridization with *G. anomalous* recorded under "Cytology" in the last report has developed chiefly on the genetic side. The second back crosses were very successful, combining great vigour, and a desirable plant habit, with lint of reasonable length and fineness and a fair ginning percentage. Considering the

(v) From the study of genetic variance in parents, F1's and F2's of all possible crosses between three strains of *G. arboreum* var *neglectum* data of great interest are now available. The preliminary stages of the analysis have demonstrated the existence of hybrid vigour even in intervarietal crosses and the existence of genetic variance in strains which have been selfed for as much as seven generations. The replicated progeny row technique developed last year has made possible the elimination of a number of disturbing factors which would have vitiated the experiment if laid out on any of the systems in common use for such purposes.

(d) *Selection, Breeding and Seed Distribution*—*Malvi Tract*—Plant breeding work has been closely linked with the study of genetic variance referred to above. The principle of bearing selection on variance as well as mean value has proved its worth, and the advantage of the replicated progeny row technique over current plant breeding methods becomes greater as time goes on. Abundant information is now available for compiling papers on the replicated progeny row technique and on the results so far achieved from it.

(i) The first achievement of the new technique has been the isolation of five sub strains from Malvi 9 which differ considerably in their morphological characters. Two of the sub strains surpass both Malvi I and Malvi 9, considerably in earliness. Spinning

* Unrigated and unmanured

tests on them and on Malvi 9 bulk show marked differences between them. They were valued as fit for the following highest standard warp counts

Strain	H	S	W	C
M9 bulk		16	s	
M9 13		20	s	
M9 15		15	s	
M9 17		22	's	
M9 19		13	s	
M9 20		21	s	

The isolation of sub strains up to 37 per cent better in spinning value from a strain which according to any current plant breeding standard would have been considered pure must be regarded as a remarkable achievement.

M9
pro
tior
car

(ii) A mill test on a full bale of Malvi 9 bulk was arranged by the Director of the Technological Laboratory, Matunga and carried out by the Bombay Dyeing and Manufacturing Co., Ltd. In nominal 20's counts it gave a test of 63 lbs, and the cotton was valued at Rs 40 on Broach.

Trade opinion is unanimous that Malvi 9 represents a great advance in quality over the old Malvi.

In view of the improvements in quality the maximum premium obtainable is about 15 per cent and the main emphasis therefore remains on increased yield rather than on increased quality.

(iii) The data given above indicate that the new Malvi strains are superior to the old Malvi in quality.

(iv) The examination of the new Malvi selections has shown that few of them attain the same yield as the old Malvi.

(v) The Dhar mass selected Malvi strain and the first seven progenies selected from it have already been tested against Malvi 9 in a full size experiment. Yield was as high as Malvi 9 but staple length and ginning per cent were somewhat lower. This first batch has therefore been discarded in favour of the next batch coming for test some of which have considerably better lint properties. Among them also, are strains with greater monopodial development than is usual in Malvi cotton. On theoretical grounds it is considered that such a habit may be of value in delaying flowering until after the risk of

late rains and then getting flowering over in a sufficiently short period to ensure the ripening of the crop before the later, greater damage from frost. The prediction will be checked by sowing and reaping records in the current season.

The Dhar Malvi material will be grown in parallel cultures at Indore and Dhar in the current season and comparisons will be made between the genetic variances of new selections from the Dhar Malvi material from Dhar and line-selected Malvi 2. The fundamental importance of plant breeding of information concerning the effect of selection on genetic variance is obvious.

(iii) The transfer of work on Valsar Upland (Amroor) to Radhawar (Dhar State), and so far in this year's sowing has already resulted in substantial progress. A strain giving monsoon yields high & yield than the Dhar has been isolated, and further progress both in time and high yielding types are being tested in the current season.

(iv) I am the Director's desire that the Dhar has now been taken for full scale test. The first quantity type - now 41 of the "yellow flowered, broad leaf" constitution which has a much higher average yield than the Dhar 2 types in the Central India section of the Narmada valley. This leading type has been isolated on account of its wide acceptance. A number of a few more narrow and also wider strains are also long and "soft".

On going to work in the Amroor area it was found that there is every reason to believe that a lot of the early work can be attained without going outside the modelled new hybrid.

(v) The organization of the breeding work at Dhar, and Radhawar, and in Narmada valley, both of this is primarily done through work from linked with the co-operation of the Government of Madhya Pradesh and the Cultural Officers of Dhar State, and of a few other agencies. The organization achieved in two seasons is a combination of scientific theory in hybridization, breeding plans breeding work on modern lines and field work in the field house, basic research and laboratory facilities developed.

(vi) The following
marked hybrids have
been obtained
from Dhar
State 1. Dhar 2
is not in the list.
2. Dhar 3

3. Dhar 4. Type 4 is excellent, but not in very large numbers, because it is not yet in commercial use. It is a dark brownish red colour with a few variegated spots. It is compared with Campers 320 and M. 20. All the varieties of the year like M. 20 were and one of them only, i.e. Dhar 30 in M. 20, if it may be retained for further trial on account of their good field bushy quality.

In Dhar 4 districts trials were carried out in three centres. Due to late sowing yields were not as good as expected but the fact that the older varieties tried.

In the Narmada valley of Dhar State trials were conducted at three centres. This is the best and largest of all these States and were conducted at three centres. This is the best and largest of all these States and were conducted at three centres. This is the best and largest of all these States and were conducted at three centres. This is the best and largest of all these States and were conducted at three centres.

The early trial in the Narmada valley of Dhar State suffered from late sowing and all the trials of Dhar 4 to Dhar 30 gave a hardly twice yield than local.

The most important feature in Malvi 2 is the characteristic that Malvi 2 is as productive as Dhar

It was carried out at four centres for evaluation. It is now safe to conclude that one variety favourable for the

latter while Malvi 9 is more profitable under all other conditions. At Chhabra in Tonk State Malvi 9 yielded as well as the local cotton and had a better staple and a considerably better ginning percentage.

In Nimar replicated trials were carried out at Khargone, Sandhwa, Kannod and

carried out
in rain and dry
greatly the
leaf shape

in Hammond classes how

(iii) Experiments on the effect of competition on the relative survival value of

much clearer in consequence

⁹ Cotton—Physiology, Pathology and Agronomy (a) Leaf roll and Red leaf of American Cottons (i) Occurrence and influence on yield.—This malady is the chief

given below

TABLE I.—Yield Differences in Healthy and Diseased Plants—1934-35
Variety P 289F at Sriganganagar, Bikaner State. Mean yield of kapas (seed cotton) in grammes per plant from 30 random pairs

CONDITION	First picking	Second picking	Third picking
Healthy	77.67	364.00	323.33
Diseased	411.33	209.67	97.67
	P	S g. differences	
Health and disease	> 0.05		
Pickings	< 0.05	5.22	
Interaction Health disease x pickings	< 0.01	6.63	

late rains and then getting flowering over in a sufficiently short period to ensure the ripening of the crop before the danger of damage from frost. The prediction will be checked by flowering and cropping records in the current season.

The Dhar Malvi material will be grown in parallel cultures at Indore and Dhar in the current season and comparison will be made between the genetic variances of new selections from the field, mass selected material from Dhar and line selected Malvi 9. The fundamental importance to plant breeders of information concerning the effect of selection on genetic variance is obvious.

(v) The transfer of work on Malwa Upland (American) to Badnawar (Dhar State), referred to in last year's report has already resulted in substantial progress. A strain giving considerably higher yield than the bulk has been isolated and further promising early strains and high quality types are being tested in the current season.

Reason to believe that a satisfactory value can be attained without going outside the material now in hand.

do not exist.

(s) Variety Trials.—Cawnpore 520 and Mollisoni were compared in randomised block trials in 1935 at the State Farm at Singanagar and in cultivators' fields both in the light soil and on the stronger Ghaggar bed soils at six centres in the Gang Canal Colony (Bikaner State). Yields were poor. Cawnpore 520 did not differ significantly from Mollisoni except in the light soil where the latter yielded significantly better. Cawnpore 520 obtained a premium of about eight annas per maund of Lapa over Mollisoni at all centres. At the State Farm eight desi strains from Lyalpur were compared with Cawnpore 520 and Mollisoni. All these strains are of poor quality like Mollisoni and out of them only two Roseum 10 and Mollisoni 74, have been retained for further trial on account of their good yield and high ginning percentage.

In Jaipur State trials were carried out at three centres. Due to late sowing yields were poor. Cawnpore 520 on the whole did better than the other varieties tried.

In the black soil area of Jodhpur State trials were conducted at three centres. This is the only tract so far studied where an Upland variety appears to be more profitable than desi types. On the basis of results obtained so far, a trial distribution of Indore 1, a selection from Malwa Upland, has been recommended.

The only trial in the black soil area of Bundi State suffered from late sowing and all varieties except Indore 1 gave a significantly lower yield than local.

The most important trials in Malwa were those carried out at four centres for comparison of Malvi 9, Dhar Cambodia and local on cotton^{*} land. It is now safe to conclude that Malvi 9 is as profitable as Upland cotton under conditions most favourable for the

* Irrigated and manured for many years.

latter, while Malvi 9 is more profitable under all other conditions. At Chhebra in Tonk State Malvi 9 yielded as well as the local cotton and had a better staple and a considerably better ginning percentage.

In Nimar replicated trials were carried out at Khargone, Sandhwa, Kennod and

(i) *Physiology*—(i) A botanical analysis of the published data on spinning quality and hair characters has been made and the findings are being put together for publication soon. (ii) Experiments on the efficiency of set out on of the small differences with uses of

(ii) Arising out of the cotton census, physiological experiments were carried out in the hope of discovering the main factors responsible for the observed differences in survival value of the four simple gene types. Monthly changes in leaf area and dry weight were determined and it was shown that while leaf shape affects very greatly the

(iii) Experiments on the effect of competition on the relative survival value of
seed
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much clearer in consequence

(iv) *Leaf roll and Red leaf* of
This malady is the chief
black cotton soils of Malwa
manured adhan soils of this
The disease however appears
the irrigated and soils of the
while the crop is maturing but
elevations in the year 1934-35

Given below

TABLE 1.—*Yield Differences in Healthy and Diseased Plants—1934-35*
Variety P 289F, at Sriganganagar, Bikaner State Mean yield of lapas (seed
cotton) in grammes per plant from 30 random pairs

CONDITION	First picking	Second picking	Third picking
Healthy	77.67	384.00	323.33
Diseased	411.33	203.67	97.67
	P	Sig differences	
Health and disease	>0.05		
Pickings	<0.05	5.22	
Interaction Health disease x pickings	<0.01	6.63	

Total yield of kapas was not affected. Most of the yield of diseased plants was

about 15 millimetres only.

(ii) *Chemical Differences in the Composition of Mature Leaves of the Healthy and Diseased Plants*—The pH values of the water extracted sap of the healthy, green Cambodia leaves were significantly higher than those of both the green and red portions of the diseased leaf. There was no difference between the sap of green and red portions of the same leaf.

TABLE 2—*pH Values of the Sap of Healthy and Diseased Leaves of Cambodia Cotton at Indore*

COMPARISON BETWEEN	Mean pH		n	t	P
	Healthy	Diseased			
1 Healthy green (whole leaves) and rolled green portions of leaves	5.82	5.59	12	2.34	<0.05
2 Healthy green (whole leaves) and red portions of leaves	5.82	5.61	12	3.53	<0.01
3 Green and red portions of rolled leaves	5.69	5.61	14	2.06	>0.05

The concentration of the sap—as indicated by osmotic pressure measurements—of healthy leaves was higher than that of unhealthy ones.

TABLE 3—*Mean Osmotic Pressures (Atmospheres) of leaf sap of Healthy and Diseased (leaf roll) Cambodia cotton plants*

Healthy	Diseased	n	t	P
6.7	5.2	120	6.87	<0.01

These observations indicated that the sap of diseased leaves was poorer in soluble matter—apparently in basic materials. This was borne out by actual analysis of samples of healthy and diseased mature leaves collected at Indore and Jaipur, boiled immediately and preserved in 90 per cent alcohol. The outstanding differences in the composition are given below—

TABLE 4—*Composition of Healthy and Diseased mature Leaves of Cambodia On Oven dry Basis*

DESCRIPTION	Mean per cent		P	Significant difference
	Healthy	Diseased		
Nitrogen	1.71	1.21	<0.05	0.39
K ₂ O + MgO/P ₂ O ₅	4.83	3.99	<0.05	0.73

(iii) Root Activity.—These differences indicated the inability of the diseased plant to maintain balanced metabolism. A comparison of the root activity of adjacent pairs of healthy and diseased plants revealed the following differences—

TABLE 5.—Differences in Root-activity of Healthy and Diseased Cambodia Cotton Plants at Indore

	Soil depth	Mean root length in inches		n	t	P
		Healthy	Diseased			
Active roots	12" downwards.	40.5	6.1	20	3.67	<0.01
Dead roots	0-12"	4.8	15.7	20	3.18	<0.01

The active root-length of diseased plants below one foot depth was significantly less and the length of dead roots was significantly greater in the upper foot for the diseased plants than the healthy ones. It appears that the extensive root death in the upper zone reduces the activity of the roots in the lower zone in diseased plants.

(iv) Soil Condition.—The concentrations of soil water from zones around healthy and diseased plants also showed the following interesting differences—

TABLE 6.—Mean Osmotic Pressures (Atmospheres) of Soil-water from Zones around Healthy and Diseased Cambodia Cotton Plants

Description	Healthy	Diseased	n	t	P
1 Upper zone 0' 3"	3.59	13.37	10	4.94	<0.01
2 Lower zone 12' 15'	10.37	17.22	10	3.43	<0.01
3 Percentage drop from lower to upper zone	62.85	22.31	10	3.84	<0.01

Osmotic pressures of soil water were less around roots of healthy plants than diseased plants. The percentage fall in osmotic pressure was greater than the percentage fall in root activity.

(b) Wilt.—(i) Periodicity.—Observations taken during the years 1933-34 and 1934-35 on the periodic fluctuations in virulence of cotton wilt (*Fusarium sp.*) have now been calculated on initial stand for each period are given.

Table 7 Numbers significantly higher than both numbers are marked with a double dagger (‡) and those t numbers with a single dagger (†) pointing one way

TABLE 7.—*Periodic Fluctuations in Wilting*

Percentage of deaths on initial stand at the beginning of each period

A Malva

Periods	F No 19 1933-34	F No 11B 1933-34	F No 19 1934-35	F No 11C 1934-35	F No 11B Seed from diseased plants 1934-35	F No 11B Seed from healthy plants 1934-35
1st	0	7.8	10.6	13.7	0	0.4
2nd	4.1	5.0	121.0	125.1	21.3	15.3†
3rd	9.2	17.5	127.7	10.2	16.3	14.3
4th	7.6	4.6	145.0	7.3	25.1	27.3†
5th	1.0	15.5	14.9	7.8	26.5	18.6†
6th	5.9	18.5	16.1	11.7	5.3	7.5
7th	0	1.9	19.1		21.5	25.2‡
8th	5.1	2.7			9.2	5.0
9th	3.7	0			19.7	10.3
10th	2.3	0			5.5	8.4
11th	3.3	10.9			5.3	5.2
12th	1.5	11.2				
13th		27.0				
P	>0.05	<0.01	<0.01	<0.01	>0.05	<0.05
Sig. Diff.		3.5	6.4	5.4		9.1

B Verum

Periods	F No 10 1933-34	F No 11B 1933-34	F No 19 1934-35	F No 11C 1934-35	F No 11B 1934-35
1st	0	1.3	7.3	12.2	0.4
2nd	0.8	3.9	9.1	21.8	8.1
3rd	2.5	8.1	18.1	15.8	6.3
4th	0	5.2	14.0	0.5	16.3
5th	3.2‡	0	7.5	1.7	9.3
6th	1.0	0.7	0.5	4.2	2.1
7th	0	0	2.0		5.0
8th	0	3.5	10.7		1.8
9th	0	0			3.7
10th	1.0	0			1.3
11th	0	0			2.0
12th	4.4†	0			
13th		2.0			
P	<0.05	>0.05	<0.01	<0.01	<0.01
Sig. Diff.	2.7		3.8	4.3	6.5

C Roseum.

Periods	F No 19 1933-34	F No 11B 1933-34	F No 19 1934-35	F No 11C 1934-35
1st	0	9.8	†10.9	10.9
2nd	5.6	17.7	5.7	†11.2
3rd	3.4	17.6	†19.5	†5.1
4th	3.0	7.6	†18.5	0.6
5th	0	18.8	2.4	3.7
6th	0	12.0	†7.5	3.6
7th	0	0.9	5.2	
8th	1.3	2.6	8.1	
9th	1.2	0		
10th	0	2.2		
11th	0	0		
12th	0	0.4		
13th	0	0		
P	>0.05	<0.01	<0.01	<0.01
Sig Diff		12.6	4.8	3.4

D Dianthus 2

Periods	F No 19 1933-34	F No 11B 1933-34	F No 19 1934-35	F No 11C 1934-35
1st	0	6.0	†10.0	4.1
2nd	1.7	9.2	4.7	3.6
3rd	2.4	†13.5	†15.3	2.9
4th	1.6	4.3	†16.9	0.8
5th	2.2	7.1	5.4	0.4
6th	0	3.3	5.8	1.1
7th	0	2.4	2.9	
8th	0.4	1.0	3.8	
9th	0.8	1.0		
10th	0	1.1		
11th		0		
12th		0		
13th		1.3		
P	>0.05	<0.05	<0.01	<0.05
Sig Diff		7.5	4.1	2.5

E Dharwar I

PERIODS	F No 19 1933-34	F No 11B 1933-34	F No 19 1934-35	F No 11C 1934-35
1st	0	10.8	11.6	7.1
2nd	19.1	16.8	10.3	11.8
3rd	11.3	18.6	21.8	2.1
4th	5.0	8.6	23.6	1.9
5th	0.6	4.6	8.7	0.8
6th	0.2	5.1	7.2	0.3
7th	0	7.0	6.3	
8th	0.6	1.5	7.1	
9th	2.3	0		
10th	0.6	3.0		
11th	0	0		
12th	0.2	1.3		
13th		0.7		
P	<0.01	<0.01	<0.01	<0.01
Sig Diff	6.8	7.6	6.1	4.1

It may be noted that (1) per odio fluctuations in death rate may not vary significantly

Irrespective of season and field Dharwar 1 showed a greater susceptibility than Dharwar 2 but there was no such difference between Verum and Roseum.

TABLE 8.—Mean percentage deaths due to wilt of resistant and susceptible varieties grown at Indore irrespective of field and season

Mean % deaths	Resistant	Susceptible	Resistant	Susceptible
	Verum	Roseum	Dharwar 2	Dharwar 1
	4.8	6.1	3.7	8.1
	P>0.05	P<0.01,	Sig Diff 1.8	

Thus it appears that a variety which is only under certain conditions susceptible may become susceptible. The variety which became susceptible at Indore was for Verum 4.8 per cent, for Dharwar 2 3.7 per cent, for Roseum 6.1 per cent and for Dharwar 1 8.1 per cent.

in the period
1 at 15 inches
This agrees

Within this period a sudden rise in death percentage seems to coincide with the sudden rise in mean duration of sunlight at the end of the monsoon, which rose from two hours to five hours daily.

In the later period, when the soil temperatures were low duration of sunlight made no difference.

(iii) *Nutrition and soil texture—Pot cultures*—In one series of pot cultures in 1934 the soil was mixed with heated soil (at the rate of 60 cartloads per acre/two inches), ferrous sulphate (at the rate of 5 cwt.s. per acre/two inches) and slaked lime (at the rate of one manure per acre).

TABLE 9.—Physical treatments, manuring of soil and wilt incidence in pot cultures
Mean death percentage

MANURES	Physical Treatments.		
	Ferrous Sulphate	Fire heated Soil	Slaked Lime
Nicflos	26.6	11.1	21.1
Ammonium sulphate	26.9	47.8	29.2
Farm compost	23.0	16.7	0
Municipal compost	0.7	25.0	8.3
	P	Sig. Diff.	
Physical treatments	>0.05	—	
Manures†	<0.05	16.2	—
Interaction (physical treatments x manures)	>0.05		
†Ammonium sulphate	Nicflos 22/18 Farm com- post 20.3	Municipal compost 13.4	13.3
34.6			

Nitrogenous treatments increased incidence as reported before (1935), in spite of textural treatments. It is to be noted that the presence of phosphorous (Nicflos) had slightly modified the influence of nitrogen.

Field tests—The uniform intensity of treatment in the subsoil plays its part. This was tested in 1934 and manurial treatment from healthy and plants was sown the following table.

* Kulkarni G S (1934) Studies in Wilt disease of cotton in the Bombay Presidency Ind. Jour. of Agr. Sci. Vol. 4, part 8, (pp. 877-1047)

TABLE 10—Significance

	VERUM		MALVI		MALVI DISEASED SEED	
	P	Sig Diff	P	Sig Diff	P	Sig Diff
Periods	<0.05	2.95	<0.05	4.28	<0.05	5.50
Manures	<0.05	1.07	<0.05	1.39	<0.05	1.73
Manures X physical treatments	<0.05	3.32	>0.05		<0.05	4.67
Manures X periods	<0.05	3.20	<0.05	4.2	<0.05	5.12
Manures X phys cal treatments X periods	<0.05	8.75	<0.05	11.61	<0.05	13.96
Physical treatments	>0.05		>0.05		>0.05	
Phys cal treatments X periods	>0.05		>0.05		>0.05	

between farm and municipal compost. The physical treatments in general made no difference but influenced the behaviour of manures with Verum and Malvi from diseased seed. For all varieties however manures influenced the periodic fluctuations and the phys cal dressing modified that influence.

It is thus clear that under field conditions application of the same manures may give varying results due to their interaction with the soil conditions and variety grown.

variety grown estimated independently

(t) Leaf Composition in wilted and healthy plants.—Mature leaves of the resistant Verum and susceptible Malvi plants—both healthy and on the point of wilting—were collected boiled in 85 per cent alcohol and analysed.

A few significant differences in composition are tabulated below—

TABLE 11.—Composition of mature leaves of healthy and wilted plants.
Mean percentages on oven dry basis

Description	Varieties and Conditions						Significance			
	Malvi.		Verum.		Varieties		Conditions		Varieties and Conditions	
	Healthy	Wilted	Healthy	Wilted	P	Sig. diff	P	Sig. diff	P	Sig. diff
Nitrogen	2.36	1.87	2.30	1.65	<0.05		>0.01	0.47	>0.05	
Phosphate (P_2O_5)	0.70	0.55	0.93	0.80	<0.05	0.23	>0.05		>0.05	
Magnesia (MgO)	1.93	0.12	0.01	0.81	>0.05		<0.01	0.66	<0.01	0.93
Ratios										
Magnesia/Nitrogen	0.80	0.06	0.39	0.54	>0.05		>0.05		<0.05	0.71
Magnesia/Potash	1.06	0.12	4.65	0.65	>0.05		>0.05		<0.05	0.80
Lime/Potash	0.81	1.84	0.60	1.15	>0.05		<0.05	0.63	>0.05	
Magnesia/Lime	1.34	0.09	0.82	0.21	>0.05		<0.05	0.66	<0.05	0.03
MgO										
$N+P_2O_5$	0.01	0.09	0.28	0.36	>0.05		>0.05		<0.05	0.34
K_2O+MgO										
$N+P_2O_5$	1.26	0.75	0.01	0.94	>0.05		<0.05	0.21	<0.05	0.29

The higher phosphate content of the resistant variety, Verum, than that of the susceptible Malvi, is due to the lower ratio of Magnesia to Nitrogen in the Malvi, or and phosphate content

(c) Nutrition in relation to environment—yield (i) "Soil variety" humus and nutrients—Pot cultures—Three years' experiments have clearly shown that the nutrition of the cotton plant

It became evident that pot-culture studies would be more serviceable to field practice if they included consideration of the possible influences on plant nutrition of the varying conditions existing between fields in the same soil type. The investigation in replicated pot cultures of the effect of differences in field soils was first taken up in 1935-36. Soils were col

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inches for the medium one. The manurial treatments were compost alone Niclos 22-18
(N P=1 soils and bot grown and plant.

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use only on rains. The

TABLE 12.—*Soil varieties, manures and cotton varieties*

Total yields of *Iapetus* per plant

A Pot cultures—gms per plant

VARIETY OF COTTON	Soil Variety	Horizon	No Manure	Compost	Nicelos 22/18	Compost and Nicelos 22/18
Cambodia—	Rich	1	2 7	17 3	13 2	8 3
		2	3 3	7 4	4 8	7 4
Indore 1	Medium	1	7 1	5 8	6 6	6 6
		2	5 5	24 1	8 8	76 0
	Poor	1	2 6	5 6	14 1	14 2
		2	4 9	10 5	11 9	14 6
Malvi 9	Rich	1	0 0	3 1	4 5	3 0
		2	0 8	5 2	13 5	3 3
	Medium	1	6 4	18 4	12 9	7 9
		2	4 4	4 4	19 6	32 7
	Poor	1	0 0	7 0	18 6	37 9
		2	0 6	16 7	8 4	31 3

Significances.

P Sig Dif

Soul "varieties"	<0.05	5.8
With or without compost	<0.01	7.8
With or without Nicifos 22/18	<0.01	7.8
Soil "varieties" x horizons	<0.05	8.3
Soil "varieties" x horizons x with or without Nicifos 22/18	{ Nearly sig. on 5%. Z value 0.6723, required 0.5951 }	14.2

All other differences are non significant

18

Compost	No Compost
15.3	7.3

5

Horizon.	Soil "variety"		
	Rich	Medium	Poor
1	6.5	8.9	12.5
2	5.7	22.0	12.4

10

Horizon	Nicifos 22/18			No Nicifos		
	Soil "variety"					
	Rich	Medium	Poor	Rich	Medium	Poor.
1	7.3	8.3	21.2	5.8	9.5	3.8
2	7.3	34.3	16.6	4.2	9.7	8.2

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Door and frame = 1.1 m x 0.8 m = 0.88 m² The yield from the second portion of

investigation. At any rate these results partly explain why 144000 cu ft. manure in 1934 were not always reproduced in the field. The consistent superiority of compost found when applied to different soils and horizons in this test has so far failed to appear in the field. Perhaps this may be due to the difference in the depth of application. Similar superiority was noted last year for a small field plot where the manure was applied
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The Cambodia plants retained their stand in all the pots but that of Malvi was reduced due to casualties by wilting. A statistical examination brought out some interesting results which are given below —

TABLE 13.—Stand for Malvi cotton

Mean of 4 pots.

TREATMENT	Soil "variety"		
	Rich	Medium.	Poor
No manure	0.7	1.5	0.2
Compost	1.2	1.0	2.0
Nicifos 22/18	1.5	1.2	1.5
Compost and Nicifos 22/18	0.7	1.5	1.7

Almost significant $Z=0.5806$ Z required = 0.5951 Sig diff. = 0.74

The unmanured rich and poor soils showed most casualties. Both compost and Nicifos 22/18 were slightly better.

The differences observed in stand due to treatment in pots suggested an examination

of the same plants in the field under similar conditions. This was done in the current year.

(ii) "Soil variety," humus and nutrients—field crops.—The favourable influence of nitrogen and phosphate on the yield of Cambodian cotton observed in pot cultures in 1934-35 could not be obtained in the field either at Dhar (Malwa) or Jaipur in experiments of the same year. The superiority of cake manure was especially for the cotton.

adequate supply of organic nitrogen and phosphate in local soils while the Cambodia cotton was growing so that reasonably high yields could be obtained as a rule. Two randomised blocks per field were designed for the following places—

(a) *In Pajpuana*—

- (1) in Jodhpur and Khetri two fields each,
- (2) in Alwar Jaipur and Bundi one field each

(b) *In Malwa*—

- (1) in Dhar and Jaora one field each
- (2) in Indore two fields.

The treatments were well rotted sheep or cattle dung manure applied at 20 cartloads per acre at sowing with ~~as manure~~ after soil ~~soil~~
preceded ~~of cultiva~~
Indore o
places w

TABLE 14.—Yields of rain sown Cambodia Cotton with Sheep or Cattle-dung manure
Total yields of Kops in lbs. per acre

BASAL DRESSING	Top Dressing	Jodhpur						Indore I P I
		Bali	Mandore	Jaipur	Bundi	Alwar	Khetri Mirapur	
Cow-dung	None	1 467	1 195	940	677	465	554	309
	Cow dung	1 488	1 312	966	701	605	445	357
Sheep dung	None	1 553	1 236	959	674	765	533	230
	Sheep dung	1 408	1 261	1 140	711	541	406	305

Significances:

P	Sig diff
<0.05	274.4
>0.05	
>0.05	
>0.05	

Places
Basal dressings
Top dressings
All interactions

PLACES

Jodhpur Bali	Jodhpur Mandore	Ja pur	Bundi.	Alwar	Khetri Mirapur	Indore I P I
1 480	1 251	1 003	691	594	454	315

The yields at Jodhpur and Jaipur were much higher than expected for a rain sown crop, and reached the level of those from hot weather sown crops at the same places in previous years while those at Bundi, Alwar and Khetri were at least equivalent to those usually obtained there with local cotton. These results seem to be significant and are being followed up. The variation of yield from region to region is interesting.

(d) Nutrition in Relation to Environment—Quality—Observations on staple-length of the podol 1 pickings of both Cambodia (Indore 1) and Malvi 0 from the pot culture test of last year have now been statistically examined. The results are tabulated below—

TABLE 15—Soil Texture, Nutrition and Staple Length of Cotton
(A) Mean Staple Length in mms

TREATMENTS	CAMBODIA—INDORE 1				MALVI 0			
	No treatment	Com post	Acid	Com post + acid	No treatment	Com post	Acid	Com post + acid
None	23.3	22.0	22.0	21.3	24.2	21.5	22.8	22.2
N	22.2	23.0	22.8	24.6	24.0	20.6	23.5	24.0
P	10.7	23.4	22.1	24.9	20.0	20.3	20.8	21.6
K	21.0	23.7	22.5	22.1	21.6	19.6	24.0	21.9
NP	17.6	21.5	21.1	22.0	21.0	20.8	23.5	21.6
NK	20.0	22.2	24.4	19.2	10.4	21.1	20.7	20.6

(B) SIGNIFICANCES

FACTORS	P	Sig diff	Interaction of first order	P	Sig diff	Interaction of higher order	P	Sig diff
a Varieties	<0.05		a×b	<0.01	0.78	d×c×a	<0.01	0.82
b Texture treatments	<0.01	0.53	{ c×a d×c	<0.05	0.52	{ d×e×b d×b×a	<0.01	1.16
c Presence or absence of nitrogen	<0.05	0.38	{ d×b d×a c×b	<0.01	0.79	d×e×b×a	<0.01	1.16
d Presence or absence of K or P	<0.01	0.39	>0.05	<0.05	0.58			

According to treatments the mean staple length for Cambodia (Indore 1) varied between 24.9 and 17.5 mms while that of Malvi 0 ranged between 24.5 and 19.4 mms.

It is interesting to note that Malvi 0 without any soil treatment had a maximum staple length about 10% lower than its own maximum staple length for treatments (compost+potash) maximum

It may be pointed out that the untreated were under the control of a long series of treatments.

The influence of subsoil

The probable effect of the present under the moisture supply differences in soil fertility appears to both deer (Malvi) & supply obtaining in the experiment.

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activities in the soil

Thus, perhaps, explains why different workers came to different conclusions on this subject, some ascribing greater importance to nitrogen, phosphate or a combination of nitrogen and potash, while others emphasized the importance of moisture supply.

The results in field experiments reported last year also support this view.

(e) Cotton nutrition in relation to environment—plant development (i) Vegetative growth and vigour—pot cultures.—In the pot culture test discussed above total dry weights of the aerial portion of the seedlings 41 days old and those of the stems and leaves separately were determined. The bulky tables of the weights and their statistical evaluation are omitted as they do not create far greater difficulties.

With Cambodia cotton when used stems but the maximum weight raised by treatment much in their

Nieffos increased the stem weight still more. This can be briefly summarized by maximum values given below—

TABLE 16.—*Ratios of minimum to maximum values of dry weights*

A. Cambodia Indore I

RATIOS	No Manure	Compost	Nieffos 22/18	Compost and Nieffos 22/18
Whole shoot	5	14	29	25
Stem	3	8	27	23
Leaf	6	13	29	27

B Malei 0

RATIOS	No Manure	Compost	Nicifos 22/18	Compost and Nicifos 22/18
Whole shoot	5	15	18	22
Stem	5	25	34	42
Leaf	5	11	12	15

The maximum increases in plant weights for Cambodia were obtained on the soil from the first horizon of the medium field and those for Malvi from its second horizon.

The ratios of the fresh weights of stems to leaves for each treatment were put to statistical examination. The results are given below —

TABLE 17.—Ratios of fresh weights, stems : leaves Indore 1935

A

COTTON VARIETY	Soil variety	Horizon	No treatment	Compost	Nicifos 22/18	Compost and Nicifos 22/18
Cambodia Indore 1	Rich	1	0.33	0.30	0.50	0.52
	Rich	2	0.37	0.42	0.30	0.40
	Medium	1	0.32	0.47	0.56	0.46
	Medium	2	0.24	0.44	0.45	0.56
	Poor	1	0.36	0.30	0.33	0.43
	Poor	2	0.20	0.31	0.40	0.49
Malvi 0	Rich	1	0.31	0.99	0.31	0.76
	Rich	2	0.34	0.37	0.28	0.45
	Medium	1	0.18	0.46	0.38	0.63
	Medium	2	0.31	0.26	0.56	0.58
	Poor	1	0.27	0.23	0.21	0.51
	Poor	2	0.35	0.24	0.35	0.53

Significances

P

Sig. diff

Compost and no compost	<0.01	0.07
B Nicifos 22/18 and no Nicifos	<0.01	0.07
Compost and no compost x cotton varieties	<0.05	0.08
C Compost and no compost x horizons x cotton varieties	<0.05	0.11

The differences due to other factors and interactions are non significant.

B

Nicifos 22/18	No Nicifos
0.46	0.35

COTTON VARIETY	HORIZON	COMPOST	NO COMPOST
Cambodia Indore 1	1	0.43	0.42
	2	0.43	0.34
Malvi 9	1	0.59	0.28
	2	0.40	0.36

(ii) Vegetative growth and vigour—field crops.—An attempt was made to ascertain the relation, if any between growth and yield of cotton plants from bulk crops in the field in 1935. The free soil moisture around the plants at different depths and stages of growth was also estimated. The observations were taken on healthy vigorous looking plants chosen at random in both a rich and a poor field. Some of them have been examined and are discussed below.—

TABLE 18.—Fresh Weights in grams of Malvi Plants 1935

Growing Stage

Stem weight

DATE	Rich field	Poor field	P	Significant difference
16th to 29th August	11.8	6.4	<0.01	2.5

Leaf weight

24th to 27th August	18.2	9.3	<0.05 }	3.8
27th to 29th August	21.7	13.0		

Flowering Stage

Stem weight

DATE.	Rich field.	Poor field	P	Significant difference
25th September to 12th October	56.6	33.8	<0.01	19.8

Leaf weight

25th September to 12th October	46.8	33.9	<0.05	11.7
--------------------------------	------	------	-------	------

ever, were high in the rich field and were found to be highly and positively correlated with the ratios of stems to leaves at growing stage. The weights of flowers, buds and unopened bolls showed a negative correlation with these ratios but it was not significant as indicated in the following table —

TABLE 19.—Correlation between Plant Growth and Yield of Malsi Cotton, Indore 1935

FIELD	A	B	C
	Total yield of kops Average per plant in gms.	Average ratio stem : leaf per plant Fresh weight—growing stage	Weight of unopened buds, bolls and flowers at the boll formation stage in gms
Poor	20.9	0.68	61.9
Rich	32.9	0.82	64.6

(1) r for A and B = +0.992, $P > 0.01$

(2) r for A and C = -0.1557 $P < 0.05$

The moisture content of the soils around the plant was also determined in both the fields at all the stages. The results are expressed on air dry basis to get as closely as possible an estimate of free water content. The depths of sampling for each stage were chosen to represent approximately the region where most of the roots were expected to function at that stage. Sampling of soils and plants was done on six days in each period and simultaneously in both fields. During boll formation a third depth was sampled in the rich field only because the other field was not deep enough.

TABLE 20.—Soil Moistures during Cotton Growth Indore—1935

Mean percentages—Air dry Basis

Soil	Growing stage 18th to 29th August		Flowering stage 25th Sept to 12th October		Boll formation stage 12th to 30th November		
	3" 6"	9" 12"	3" 6"	12" 15"	5" 9"	12" 15"	18" 21"
Variety	3" 6"	9" 12"	3" 6"	12" 15"	5" 9"	12" 15"	18" 21"
Rich	14.3	12.9	14.4	14.4	12.7	12.3	12.5
Poor	17.4	15.8	21.7	20.9	13.2	13.1	12.5

Up to flowering stage the poor field maintained a higher moisture level than the rich one in both horizons. During the growing stage the moisture fluctuated a little the

upper zone being either as moist or moister than the lower zone. The moisture gradually diminished during the flowering stage and was then the same for both horizons. At maturity there was no difference in moisture content either between fields or their horizons.

The differences found in this test between the two fields were in the quantity and nature of plant growth in the early stage and in the content of free water in the soil. Plant growth in the poor field was greater than in the good field. In the good field also moisture was equal in their nutrient content for the poor field failed to secure a proportion of a lower yield by a lower yield of *kapas* after quantity of moisture up to the flowering stage may have some relation to this.

(iii) Root growth and repair—field crops.—The differences in root activity observed between healthy and diseased cotton plants suggested similar observations on plants

At maturity the weights of monopodial and sympodial parts were taken.

Two months after sowing the pre rains sown plants gave a higher shoot weight than the rains-sown. At second picking i.e. when the maturing stage was coming to an end the superiority in shoot weight still persisted for the Cambodia variety but not for Malvi. Pre rains-sown plants of both varieties gave higher weights of monopodial parts than of sympodial ones.

For the two varieties the total weight and that of the monopodia at maturity were proportionate to the total weight at the age of two months.

TABLE 21.—Correlations (1933)

Correlations between	r	P
Shoot weight at two months after sowing and—		
(a) Shoot weight at 2nd picking	0.9580	<0.05
(b) Weight of monopodia at 2nd picking	0.9557	<0.05
(c) Weight of sympodia at 2nd picking	0.9021	>0.05

The pre rains sown plants of both the varieties produced more bolls and greater weight of *kapas* than those rains sown.

This was mainly due to the maturing of more bolls and not to heavier ones.

The examination of root lengths yielded the following results —

TABLE 22 — *Influence of age and season on root-development of cotton
(with special reference to activity and death rate)*

(0-9 inches soil horizon.)

	One month after Sowing			Two months after Sowing		At second Picking	
	Date of sowing	Malvi	Cambodia	Malvi	Cambodia	Malvi	Cambodia
Total root length (inches)	Pre rains	07	127	191	241	09	164
	Rains	150	263	253	327	110	134
Length of active roots as per cent of total	Pre rains	63	60	20	42	5	9
	Rains	71	74	31	40	2	6
Length of dead roots as per cent of total	Pre rains	7	5	53	34	52	44
	Rains	8	5	53	35	40	46

Significances

TREATMENTS	Total Root length		Length of Active Roots as per cent of total		Length of Dead Roots as per cent of total	
	P	Sig diff	P	Sig diff	P	Sig diff
Varieties	<0.01	4	<0.01	6	>0.01	6
Sowing dates	<0.05	34	>0.05		>0.05	
Stages of growth	<0.05	41	<0.05	2	<0.05	6
Varieties and stages of growth	>0.05		<0.05	3	<0.05	8
Sowing dates and stages of growth	<0.05	58	>0.05		>0.05	..

The differences due to other treatments are non significant

Statistically significant differences in root lengths were restricted to the upper 9 inch zone which contained the major portion of the total length

The total root length reached its maximum two months after sowing. It was always greater for the rains sown than for the higher yielding pre rains-sown crop

Percentage length of active roots was highest one month after sowing for both varieties, at both sowing dates while that of dead roots continuously increased with the further growth of Cambodia but with Malvi it reached its maximum two months after sowing and then remained constant

Thus, the differences observed in yield and aerial development between the pre rains sown and rains-sown crops were not paralleled by other properties of the root lengths except the totals for the rains-sown crop at the end of the first and second months from sowing.

Differences in availability of moisture cannot account for the greater root length of the rains-sown crops. This seems to be due to different quantities of nutrients for every unit of soil surface tapped. The struggle of the rains-sown plants for adequate nutrition seems to be only partially successful and it seems to be more intense one month after sowing than later. Rains-sown Cambodia is presumably more handicapped than Malvi. This is illustrated in the following table.

TABLE 23.—Root Development in relation to Plant growth of rains sown
and pre rains sown crops

Ratios of values of rains-grown to those of pre-rains sown crops

VARIETY	Total Root length		Fresh Weights	
	One month after sowing	Two months after sowing	Whole shoot two months after sowing	Mongopoda (at second picking)
Malvi Cambodia :	1 6 2 0	1 3 1 4	0 6 0 8	0 8 0 6

... is the suggestion

fully developed unirrigated crop. In 1931, a test was made with cotton and other crops. The treatments used and results obtained are given below:-

TABLE 24.—Moisture conserving treatments and yield of Lapsi, Jaipur 1934

Lbs per acre				
No Treatment	Compost	Bundling and Intercultivation	Bundling Intercultivation and Compost	Weeding
358	509	368	460	420

Compost was added at the rate of 5 cartloads per acre

The rainfall for the season was 21.63 inches. There seemed an indication of check weed or a light dressing of compost having the desired effect.

In 1935 a replicated experiment was designed to test the immediate and cumulative effect of the following treatments on cotton and other rotation crops —

Main treatments—

1. No banding
2. Contour banding at 100 ft. distance
3. Contour banding at 50 ft. distance

Sub-treatments —

1. No manure
2. Compost at 5 cartloads per acre

There were six replications of the experiment. The rainfall was 19.63 inches for the season, the crop suffered from drought in the month of August i.e., during most of its growing stage, and the yields were abnormally low.

The results, however, are interesting.

TABLE 25.—Moisture-conserving treatments and yield of Cotton, Jaipur 1935.

Lbs. per acre.

CONTOUR BANDING AT	With Compost	Without Compost
100 ft.	90.4	89.8
50 ft.	67.7	61.5
No banding	75.3	29.1

R.

With Compost	Without Compost	F	Sig. diff.
** 7	53.1	<0.01	20.1

Other differences are not significant.

It is interesting that the results of both years are similar and that a dressing of compost only at five cartloads per acre has given strongly significant differences. The similar effect of a light dressing of compost has been observed in another experiment reported later.

Soil moisture and plant weights at different stages of growth have been taken in this test, which is being continued with slight modifications.

10. *Crops other than cotton*—This has been omitted as it does not deal with cotton.

11. *Statistics and field trial technique*—The statistical work undertaken during the year has been primarily that necessary for the proper design, conduct and analysis of the experiments referred to under other heads. The field technique of progeny row testing has been further developed, in particular by the arrangement of progenies in compact family blocks, in order to deal with problems of increasing importance involving the comparison of variances. Methods of studying the relation between root disease incidence and root morphology have been developed for studies in the genetics of wilt resistance at Indore and root rot resistance at Baroda.

Statistical work in connection with out station variety trials has been continued and a paper on the results of variety testing in Central India and Rajputana has been accepted for publication in "Agriculture and Livestock in India". The technique employed has been developed into a coherent programme from preliminary small growth tests at selected stations to widely distributed trial and demonstration blocks on cultivators' fields in which varieties proved satisfactory on State farms are further tested and demonstrated simultaneously under a wide range of conditions under the cultivator's own eye. This programme is the subject of a paper now in preparation.

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selection used, and that a large amount of genetic variance in commercial characters easily detectable by the replicated progeny row method of breeding had escaped notice during the years when non replicated progeny row breeding was in use.

The statistical work of the section has been extended to parts of India not normally served by the

and Botanist spent a week in Cawnpore studying the cotton breeding work in progress there. In his subsequent report he emphasised the need for a closely co-ordinated testing programme embracing all stages of development from the plant breeder to the officers in charge of propaganda and distribution. In collaboration with the Statistical Assistant he drew up a draft experimental programme for the current season which has been adopted by the Director of Agriculture.

The Geneticist and Botanist's visit to Cawnpore facilitated close collaboration between the Economic Botanist on Cotton to the United Provinces Government and the Institute in North Bikaner and the t
grown in t
and Indor
Improvement
Cawnpore

There appears to be a growing interest in statistical methods to breeding problems. In volume of research correspondence, training has for the whole year, and two others for periods recently joined, and intends to stay for a year.

— of the application of

* Financed by a grant from the Indian Central Cotton Committee to the Baroda State Department of Agriculture.
† Financed by a grant from the Indian Central Cotton Committee to the Bikaner State Department of Agriculture.
‡ Financed by a grant from the Indian Central Cotton Committee to the United Provinces Department of Agriculture.

12 Miscellaneous—(a) *Scope for manuring of crops*—Several experiments are in progress to compare the utility of green manuring, application of cattle manure or compost or of artificial, singly or together, on cotton, rice, wheat, sugarcane and other crops according to the special requirements of each locality.

(i) *Unirrigated black cotton soil tracts in Malwa*—*Composts*—Immediate and cumulative effect on normal rotation crops. Indefinite and non significant results were obtained from several one season trials comparing the manurial value of composts for unirrigated cotton and groundnut. The response was more definite for jowar and irrigated wheat.

TABLE 46

Response of crops to compost

Lbs. per acre.

A. Jowar—Local Malwa (1933)

Yield of	Municipal compost	Farm compost	No manure	P	Sig diff
Grain Kabbi (dry)	1,012 7,702	906 4,812	837 4,612	<0.05 <0.05	105 1,065

B. Variety—Wheat, Pusa 12, irrigated once (1932)

Yield of	Compost		Municipal compost		Ammonium sulphate		P	Sig diff		
	Nitrogen, lbs		Nitrogen, lbs		Nitrogen, lbs					
	36.72	110.16	36.72	110.16	36.72	110.16				
Grain Bhusa	1,358 1,564	1,674 2,170	1,343 1,465	1,830 2,216	1,063 1,275	1,240 1,609	<0.05 <0.05	375 528		

A long term experiment was started in 1932 and will be continued further and to find out the best way of manuring.

moist soil but it was mixed with the looser surface soil by a bolker when applied to the hard dry soil before rains. The sequence of crops in the rotation was jowar, groundnut, cotton and wheat. Some of the results are given below—

TABLE 47
Efficacy of Compost Manuring on BIS 1 Cotton Soil of Medium Fertility at Indore
Yield—Iba per acre

Crop	1934-35	1935-36	P	Sig. diff.
Jowar				
Groundnut	305	946	<0.01	330
Wheat	403	984	<0.05	324
	562	513	>0.05	

B

Crop	Municipal compost		Farm compost		No manure	
	1934-35	1935-36	1934-35	1935-36	1934-35	1935-36
Jowar	310	1012	320	928	248	848
Groundnut	515	1002	351	983	282	827
Wheat	601	604	650	460	525	467

Seasons x manures P > 0.05

C

Groundnut (1934 and 1936)

Municipal compost	Farm compost	No manure	P	Sig. diff.
768	667	555	<0.01	108

D

Groundnut (1934 and 1935)

Time of manuring	Field No 1 with defective drainage		Field No 18 well drained		P	Sig. diff.
	Municipal compost	Farm compost	Municipal compost	Farm compost		
Before rains	658	823	767	552		
After rains	649	673	578	622	{<0.05}	134

Wheat (1934 and 1935)

Date of manuring	Field No. 1 with defective drainage			Field No. 18 well drained			P	Sig. diff.
	Municipal compost	Farm com post	No manure	Municipal compost	Farm com post	No manure		
Before rains	728	623	589	430	422	404	<0.05	61
After rains	838	805	603	438	471	446	<0.05	127

1

Crop	Municipal compost	Farm compost	No manure	P	Sig. diff.
Jowar	663	624	548	>0.05	
Cotton	629	563	527	>0.05	

Change of season did not affect the influence of the composts on jowar, groundnut and wheat. The results of the cotton crop are available only for one season. Significantly increased yields were obtained only with groundnut and wheat by compost application.

For groundnut municipal compost was superior to farm compost, the application of which also increased yields on both the fields. Municipal compost was superior to farm compost on the field with defective drainage irrespective of date of application. It was so on the well drained field only when applied before rains. Under well drained conditions pre-rains application of municipal compost proved superior to post rains application but there was no such difference when the drainage was defective. The behaviour of farm compost was exactly the reverse.

For wheat the only yield increases obtained were on the field with defective drainage, due to post rain application of farm compost and to both applications of municipal compost.

The cotton crop did not appreciably respond to manuring.

The experiment needs to be continued before final conclusions can be drawn. It may be that the cumulative effect is not yet intensive enough to show appreciable differences but the results explain why the proportion of manuring unirrigated crops is

but irrespective of the date of application and it was much more effective on groundnut when applied before rains than after. It is not possible to say definitely on the basis of the present data whether these two manures differ in their power to improve tilth or

whether their different effect is due to their chemical composition. Perhaps however, the absence of any such difference on the well drained field gives a clue. Differences in nutrient composition of the manures should ordinarily be expected to be operative even there and it is well known that the adverse effect of defective drainage may reach almost to the soil surface the main difference between a well drained and an ill drained field being in the depth to which good tilth exists below the surface. Naturally if the soil tilth under field conditions reaches the required standard in the horizon occupied by the crop concerned it is not likely to be markedly benefited further by applications of humified organic matter. Crops like wheat which need deep tilth to start with, respond to such manuring only when that tilth is absent as usually happens with ill drained fields. Such response is more vivid when the manure is applied after rains because the ~~wet season~~ movement is co-well-drained.

Application of organic matter irrespective of dates is always useful. The application of farm compost before rains is beneficial on fields with defective drainage but municipal compost also on well-drained land. Thus perhaps indicates a greater flocculating power in this compost. The higher yields obtained on the field with defective drainage with each treatment may be more due to better moisture retention after the rains because of tilth improvement than to the nutrients. On the well drained land, with its initial better texture any improvement would be less pronounced.

Green manuring—Influence of different methods on wheat

It has already been reported that while green manure might benefit a succeeding wheat crop its favourable effect was problematical on the following cotton crop. The points awaiting settlement in this problem appear to be —

- Whether green manuring would be equally beneficial to wheat in a year of low rainfall
- Whether it would make any difference if the green manure is ploughed in at different stages of growth or only laid flat on the soil surface or cut and removed.
- Whether the most suitable green cover crops—senna and cowpea for the Malwa tract—differ in their manurial value
- Whether green manuring for wheat as a system in the rotation will show a cumulative effect sufficient to benefit the cotton crop also

Two tests one in 1933 on medium land and the other in 1934 on rich land were carried out at Indore testing the effect on wheat of green manuring with senna in the different ways set out below —

Treatment	Approximate intervals from sowing in weeks.	
	1933 test	1934 test
No green manuring	4	
Seedling crop ploughed in	8	6
Ploughed in at growing stage		6
Cut and removed at growing stage	12	10
Ploughed in at flowering stage	12	10
Cut and removed at flowering stage		

Both these years were very wet (31.82 and 35.80 inches respectively). Hence, the test was repeated in 1933 in a modified form. The rainfall of this year was moderate (34.33 inches). The treatments in this test were —

Main treatments —

Fallow—(1) direct vs and (2) free drainage.

Sub-treatments I —

Kinds of green manure (1) sunn, (2) cowpea.

Sub-treatments II —

Approximate time in weeks after sowing and method of application at each time.

(a) Periods for —

- (1) 2 x weeks after sowing
- (2) Eight weeks after sowing
- (3) Eleven weeks after sowing

(b) Methods for —

- (4) Cutting and removing
- (5) Cutting and spreading
- (6) Ploughing in.

The last treatment was omitted for the eleven week period for obvious reasons.
The results are —

TABLE 42
Green manuring with Sunn for wheat
1 bu. per acre
A. 1933 test (mod. vs land)

Treatment	Grain.	Straw.
No green manuring	745	1463
Cutting crop ploughed in	909	1401
Ploughed in at growing stage	547	1333
Ploughed in at flowering stage	571	1074
Cut and removed at flowering stage	764	1202
P	40.05	40.05
Significant differences	231	218

R.

1934 test (rich land)

Treatment	Grain.	Straw.
No green manuring	933	1121
Ploughed in at growing stage	1063	1231
Cut and removed at growing stage	878	1144
Ploughed in at flowering stage	1004	1477
Cut and removed at flowering stage	997	1243

C
Bhusa

No green manuring	Ploughed in	Cut and removed	P	Sig. diff.
1121	1364	1214	<0.05	170

D

1935 test (poor land)

Interval in weeks from sowing	Treatment	Method of green manuring	Kind of green manure			
			Sann	Cowpea	Sann	Cowpea
6	Cut and removed		252	383	148	280
	Cut and spread		340	280	156	316
	Ploughed in		208	420	260	568
8	Cut and removed		400	440	168	256
	Cut and spread		240	356	196	344
	Ploughed in		284	452	284	430
11	Cut and removed		368	424	140	612
	Ploughed in		424	361	180	468

E

Kind of green manure	Well drained field.	Field with defective drainage	P	Sig. diff.
Sann	314	191		
Cowpea	393	428	<0.05	100

F

Out and removed	Cut and spread	Ploughed in	P	Sig. diff.
291	278	382	<0.05	78

In the very wet season of 1933 green manuring on a medium field had adversely affected the yield. Thus harmful effect increased with the period allowing effect was visible even when there was no depression in yields when the green

Grain yields were not appreciably affected by green manure on fertile land whether ploughed in or cut and removed irrespective of its stage of growth. Ploughing in the green manure irrespective of its stage of growth significantly increased the yields of bhans but when the green crop was cut and removed the increase was not appreciable.

In a season of moderate rainfall, 1935 different methods of manuring with sann or cowpea were compared on poor land with or without good drainage. The cowpea crop behaved equally well on both types of land but sann fared better under well drained conditions. On ill drained land cowpea was superior to sann but no such difference was observed under good drainage. Both the green manures proved better when ploughed in.

These results indicate that under local conditions green manures may depress yields even when moisture supply is sufficient. This seems to be due to unfavourable physical condition of the soil preventing aerobic decomposition.

The superiority of the coarse and woody cowpea to the soft sann observed on ill drained land is probably due to the greater amount of nitrogen in the green manure ad The year on that soil for rabbit wash is

(ii) Unirrigated soils of Rayputana—Manuring methods—In addition to the use

TABLE 49 Efficacy of different methods of manuring
Yield of seed cotton—lbs per acre
Variety—Desi cotton (local)

Treatment	Pickings						Total
	1st	2nd	3rd	4th	5th	6th	
Compost	93	105	185	288	219	99	989
Cultivator's method of bullock folding	100	116	170	258	222	108	974
Ban Farm method of bullock folding	90	100	169	294	196	86	935
Cultivator's manure	54	82	141	260	219	138	894
Artificial manure full dose	92	85	163	215	193	99	877
Artificial manure one fourth dose	46	68	116	294	196	84	794
Control (no treatment)	52	64	103	158	145	95	619

It seems that organic nitrogen has proved superior to inorganic, similarly using manure or unrotted residues appears to be more effective than the application of half-rotted or unrotted residues. The soil showed no advantage in patches and most of the manure incorporated in the soil gave some incorporation the higher yielding treatment seems to be the result of such treatment.

These results are being followed up by a quantitative field trial of a complex design including the following treatments.

Main treatments

- (1) Control (no treatment)
- (2) Urine alone supplied by cultivator + cattle folding the dung being removed and weighed.
- (3) Bas modification of cattle folding
- (4) Compost full dose—rate equivalent to nitrogen in full artificial manures
- (5) Compost quarter dose
- (6) Complete artificial manures—rate equivalent to nitrogen in dung supplied by cattle-folding
- (7) Complete artificial manures quarter dose

Sub treatments

- (1) Control (no treatment)
- (2) Green manuring with guara ploughed in at flowering stage
- (3) Green manuring with guara cut and removed at flowering and weighed (to be used for fodder)
- (4) Green manuring with sann as in (2)
- (5) Green manuring with sann as in (3)
(To be used for cattle bedding)

An intensive rotation of wheat and cotton both irrigated has been adopted for this test.

The results for wheat are available and are tabulated below —

TABLE 50 Efficiency of different methods of manuring

Yield of wheat (local) grain—mts per acre

Bas Farm Jaipur 1935-36

Treatment	No green manure treatment	Guara ploughed in	Guara cut and removed	Sann ploughed in	Sann cut and removed	Mean
Control	15.8	14.4	15.5	16.6	9.7	14.4
Cultivator + cattle folding	20.9	20.2	14.8	15.1	16.9	17.8
Bas modification of cattle folding	21.1	20.8	16.6	20.5	14.4	19.3
Compost full dose	21.2	24.9	19.4	25.2	16.6	21.4
Compost quarter dose	17.3	19.4	14.4	15.1	15.1	16.3
Artificial manure full dose	25.9	21.6	21.6	25.2	20.9	23.0
Artificial manure quarter dose	19.1	14.8	17.3	16.9	9.4	15.5
Mean	20.6	19.4	17.1	19.2	14.7	

(a) Significance

(b) Basic manuring

Green manuring

P S.g. d.f.

<0.05 5.6

<0.05 3.0

Interaction is not significant

TABLE 51.—Effect of different methods of manuring
Yield of wheat (lokal) grain—mts. per acre.

Treatment.	No green manure treatment	Green ploughed in	Green cut and removed	Soil ploughed in	Soil cut and removed
Control	46.1	34.6	48.4	46.5	24.3
Cultivation + cattle-falling	69.4	37.8	43.7	55.7	41.0
Straw cultivation + cattle-falling	63.7	49.7	62.7	34.4	43.3
Compost, full dose	63.7	63.0	54.0	62.7	45.4
Compost, quarter dose	57.6	52.6	49.3	41.0	39.6
Arial manure, full dose	50.7	44.8	64.6	69.9	46.9
Arial manure, quarter dose	61.6	41.6	49.0	50.6	32.4
Mean	62.6	32.3	31.4	54.9	41.3

S. significance.
Green manuring
Other factors are not significant.

P. <0.05 S.E. d.f. 93

The response of wheat to the manuring treatments may differ from that of cotton in that the yield of wheat is not affected by the application of cattle manure both the cattle manure and the straw manure being equally effective in increasing the yield of wheat.

Straw yield is not affected by any treatment except the ploughing-in of the pure crop and the removal after harvest of both the green manures which is treated as a cereal crop.

Concurrently with this test another field trial was carried out in duplicate plots simultaneously at six places in Rajputana, with a view to ascertain whether it made any difference on the yield of the subsequent wheat crop if (1) cattle manure is applied in the beginning of the kharif season or at the end of it, before the stub cultivation; (2) whether a supplementary ploughing-in, or harvesting and removal of green manure grown *in situ* will have any further effect. The results are given below:

TABLE 52.—Effect of different methods of manuring
Yield of wheat (lokal) grain—mts. per acre.

Places.	Cattle-manure.					
	Kharif			Dose		
	Green Manure					
	Ploughed in	Removed	None	Ploughed in	Removed	None
Alwar .	15.9	17.9	12.4	15.0	18.3	14.4
Jalmer .	29.3	30.6	29.3	30.3	25.6	27.3
Jodhpur .	20.4	22.9	21.9	21.6	19.1	16.9

Significance.
(a) Places

P. <0.05 S.E. d.f. 5.46

TABLE 53.—*F*ficacy of different methods of manuring

A.—1 seld of wheat (local) bhutan ends per acre

Places.	Cattle manuring					
	Kharif			Rabi		
	Green Manure					
	Ploughed in	Removed	None	Ploughed in	Removed	None
Alwar	30.6	30.8	22.4	28.6	30.8	24.9
Jaipur	71.8	70.5	60.6	73.0	67.6	63.6
Jodhpur	32.0	29.4	29.8	28.1	25.8	23.1

Significances

	P	Sig. diff.
(a) Places	<0.05	20.93
(b) Time of application of cattle manure	<0.01	2.25
(c) Green manuring	<0.05	4.40
(d) Places and time of application of cattle manure	<0.05	2.12

The remaining differences are not significant

B (c) Green manuring

Ploughed in	Removed	None
44.1	40.8	37.4

C

(d) Places, Time of application of cattle manure

Cattle manure applied in	Alwar	Jaipur	Jodhpur
Kharif	27.9	67.6	30.4
Rabi	28.1	65.0	25.7

As far as the grain yields are concerned it is immaterial whether cattle manure is added in the beginning or at the end of the season. Yields remain unaffected whether green manure is grown in addition and ploughed in or removed.

The yield of straw is increased, except at Alwar, when cattle manure is given in the kharif and it is further increased when in addition green manure is ploughed in.

Yet another experiment was carried out on the estates of Messrs the Bundi Agricultural Syndicate, Bundi State, in order to test the possible advantage of supplementary dressings of artificial manure after ploughing green manure in the land intended for wheat. Two grades of Nicofos were applied at one and two cwt per acre.

TABLE 54 *Efficacy of different methods of manuring*

A.

Variety—Local wheat

Mds. per acre

Treatment	Grain			Straw		
	Area B	Area E	Area H	Area B	Area E	Area H
Control	20.4	28.3	32.8	40.0	44.5	45.4
Nicofos 22/18 at 1 cwt /acre	35.3	40.8	39.5	57.2	65.8	70.0
Nicofos 22/18 at 2 cwt /acre	32.0	43.9	38.1	75.1	73.7	71.1
Nicofos 17/45 at 1 cwt /acre	32.3	40.2	42.2	40.8	61.2	66.6
Nicofos 17/45 at 2 cwt /acre	37.2	39.4	42.3	73.4	81.2	80.5

Significances	Grain		Straw	
	P	Sig. diff.	P	Sig. diff.
(a) Manure vs no manure	<0.05	6.9	<0.01	14.8
(b) Units of manure	>0.05		<0.01	13.2
(c) Soil types	<0.05	4.9	>0.05	

All other differences are not significant

B

	Artificial manure vs no manure		Units of manure	
	Manure	No manure	One cwt per acre	Two cwt per acre
Grain	38.6	30.2		
Straw	69.0	43.6	61.9	76.0

Both grades of Nicofos were equally effective in increasing the yields of grain and straw. Increased rate of application from one to two cwt did not influence grain yield but the production of straw increased with the rate of manuring.

The results enumerated above are of great practical value for the Rajputana cultivator whose soils require manure even for unirrigated crops and whose resources of vegetable

residues for making manure are limited. Cattle urine can be utilized by the current method of folding. The droppings which have no additional manurial effect in the system, can be made into compost together with other available residues to be applied to fields where cattle are not tethered or folded.

Green manuring if judiciously used has its place and it does not seem to be always less effective than other methods of manuring. The cost of green manure is not very high. There is a great variety of resources open (subject to economic limitations discussed below) to the local cultivator for satisfying the manurial needs of his land.

Economics—The relative scope for cattle folding, application of compost or artificial manures has been discussed above in the light of crop response. From a practical point of view it is equally important to take into consideration the cost involved. Such records are available mainly from the Jaipur experiments.

TABLE 53 Costs for different methods of manuring

Rupees per acre

Year	Farmer's manure	Compost from		Cultivator's cattle folding	Basic modification of cattle folding	Artificial manures	
		Dung alone	Dung and residues			Full dose	Quarter dose
1934	Rs 1 6 1	Rs 1 p	Rs 1 p	Rs 1 p	Rs 2 9 3	Rs 1 5 0	Rs 7 12 6
1935		3 4 9	4 4 9		2 2 3	25 15 0	8 7 9
			0 10 8				

Note.—(1) Rates Rs per acre—

Compost 1934—6 000 lbs

1935—Full dose—12 820 lbs

Quarter dose—3 050 lbs

(2) Artificial manures—

1934—a mixture of Nitrofer 22/18 at 250 lbs and pot. sulph. at 111.2 lbs per acre

1935—Full dose—Nitrofer 17/45 at 118 lbs amm. sulph. at 174.6 lbs and pot. sulph. at 110

lbs per acre mixed together

Quarter dose—One-fourth of the above quantities

Details of cost—Farmer's manure—Ten cartloads (120 mds) of the manure were made according to the cultivator's usual method. The costs involved were $\frac{1}{4}$ cost of making pit 2 as, charging 3 as, carting Rs 1 9 and spreading 4 as, Total Rs. 2 2

Cultivator's cattle folding—No cost was involved because the land gets the treatment during routine cattle management.

Basic modification of cattle folding—The only cost involved is for mixing the dung and urine earth uniformly with the soil. Folding was done in 1934 with three bullocks, one buffalo and one cow on a 1/55 acre plot for three days. The cost for spreading was 9 p. for the plot.

In 1935 four cows and four bullocks were tethered on a 1/44 acre plot for three days. The cost involved was 9 3 p. per plot.

Farm compost making — Ten cartloads (120 mds) were made in 1934 by the standard Indore method. The costs involved were $\frac{1}{2}$ cost of making p t 4 as. charging 6 as. watering Re 1 2 turning Rs. 1 1 $\frac{1}{2}$ collection of bedding Re 1 carting Rs. 1 9 and spreading 4 as. Total Rs 6 5 6

In 1935 466 3 mds of bedding were composted by the rain watered process with 155 5 mds. of dung wh ch produced 513 mds of ripe compost. The costs involved were collecting and removing the dung from fields Re 1 8 4 charging heaps Rs. 5 0 8 and turnings Rs 2 12 0 Total Rs. 9 5 0 Rate of wages for one man day of 8 hours = 4 as.

No cost is incurred by the cultivator a folding and there was no significant difference between the yields obtained by this method and by the quarter rate of compost. The yields obtained by both these methods were not significantly different from those obtained

it

It is necessary however to ascertain the cumulative effects of these treatments both on cotton and wheat before final conclusions are drawn.

The results from Bundi reported above show that an average increase of about manuring is
one cwt
aund will

a cu us cw —

TABLE 55 *Responses of local crops to manuring*

Gang Canal Colony Sriganganagar Bikaner

Lbs per acre of grain for *Toria* wheat and *tsl kapas* for cotton and tons per acre for maize and cowpea mixed fodder

A

Treatments in 1932

Crop	With Compost	Without Compost	P	Significant difference.
<i>Toria</i> (1932)	702	581	<0.05	88.3

Compost was applied at a rate equivalent in nitrogen content to that supplied by green manures.

B

Treatments in 1932

Crop	Fallow	Green manure		P	Significant difference
		Guara	Sann		
Torta (1932)	940	534	504	<0.05	110.6
Cotton (1933)	742	593	559	0.01	143.5

C

Treatments in 1932

Crop	Green manure		P	Significant difference
	Ploughed in	Cut and removed		
Cotton (1933)	1066	850	<0.01	143.6
Maize and Cowpeas mixed Tu	5.57 tons 218	4.71 tons 170	<0.01 <0.01 <0.01	0.75 tons 45.0

D

Treatments in 1934

Crop	Fallow	Guara		P	Significant difference.
		2 months after sowing	At flowering		
Torta (1934-35)	1,361	1,107	1,099	<0.05	205.0
Wheat (1934-35)	1,788	1,943	1,955		

E

Treatments in 1934—Cotton in 1935 30

Crop	Fallow		Guara ploughed in 2 months after sowing		Guara ploughed in at flowering stage	
	*Compost	No Com post	*Compost	No Com post	*Compost	No Com post
Cotton	308	281	327	341	408	338

All factors and interactions are non significant

*Compost at 20 carts per acre

F.

1934 35

Variety and treatment	Control	Castor cake at 1,000 lbs per acre	Nicifos 22/15 at 170 lbs per acre
Mollison:			
Heavy irrigation, May sowing—			
Plant spacing 6"	673	794	1,057
" 12"	666	782	1,089
Moderate irrigation—			
Plant spacing 12"	746	1,031	879
P 289 F			
Heavy irrigation May sowing—			
Plant spacing 6"	724	1,153	1,140
" 12"	782	1,102	955

Note.—Green manurial treatment was given before the *toro* or wheat crops. Other crops followed without repetition of the treatments.

It is quite clear that compost under local conditions benefited only the crop immediately following (*toro*, 1932). Green manure is distinctly harmful when ploughed in for a crop (*toro*) sown in October but is distinctly beneficial when it is sown in November (wheat).

Compost shows no residual effects while those of green manure can be seen for three succeeding crops—cotton, *toro*, and *toro*. The effect however is small (10 days). Ploughing in the green manure seems to be better than simply growing, harvesting and removing it.

The scope for the use of artificial manures seems to be even greater, but the conditions optimum for their utilization still require careful determination.

(b) Soil erosion—Several plants of different habits of growth have now shown themselves capable of regenerating every year, either vegetatively or from fallen seed, when grown without irrigation on the black cotton soil of Indore. In addition, there are some with an evergreen habit. Attempts are now being made to discover the best method of using them to form root bound bunds along field contours as checks to sheet erosion by heavy rains. Most of the crops have a good feeding value. The following table includes the most promising varieties—

TABLE 57 Plants likely to be useful for erosion control

Name	Habit	Mode of regeneration
Grasses		
Paspalum dilatatum	Stems short	Vegetative & seed
Kikuyu grass	Creeping	" "
Budaa grass	Stems erect, medium height	" "
Gaines grass	Stems tall	" "
Reona luxurians	" "	" "
Wimberley's grass	Stems short	" "
Khans grass	" "	" "
Other plants—		
Chicory	Dwarf, erect	Seed
Kollingi	Dwarf, spreading	"
Tephrosia Candicans and Poyetii	Tall	"
Tur (<i>Cajanus indicus</i>)	Tall, branching	"

(c) Crop rotations An experiment comparing five rotations was started in 1933. They were—

Year	Rotation.				
	1	2	3	4	5
First	Wheat	Cowpeas followed by wheat	Cowpeas followed by wheat	Groundnut	Groundnut
Second	Jowar	Groundnut	Jowar	Jowar	Cowpeas followed by wheat
Third	Tur	Jowar with tur	Groundnut	Cowpeas followed by wheat	Jowar
Fourth	Cotton	Cotton	Cotton	Cotton	Cotton.

The experiment has run for three years, the results with cotton are given below

TABLE 58
*The Influence of previous crops on cotton at Indore
 1933-35*

Yield of katas lbs per acre

Year	Previous Crops			P	Sig. diff
	Tur	Groundnut	Cowpeas Wheat		
1934	177	197	153	>0.05	
	<i>Jowar and tur</i>		<i>Jowar</i>		
	215		331		
1933				<0.05	100
1935	325		333		

In 1934 cotton yields did not vary significantly whether the previous crop was tur groundnut or cowpeas followed by wheat. This was a very wet year and it is not yet certain if similar results will be obtained in a normal season because in the year 1935 of moderate rainfall though the yields of cotton after jowar showed no increase they were significantly higher after jowar and tur than in the wet year 1933. This means that in a wet year cotton yields may be depressed if the previous crop is jowar with tur.

Other crops.—The yield of dry groundnuts following cowpeas and wheat and those of wheat grain following groundnut in the previous year and a catch kharif crop of cowpeas are given below.—

TABLE 59
Yields of groundnuts and wheat grain

Lbs per acre

Indore 1933 and 1935

Year	Groundnut	Wheat	P	Sig. diff
1933	1622	282	<0.05	100
1935	264	379		

Differences in season made no difference in the yield of wheat. The low yields of groundnut in 1935 were due to the damage done by jackals at the ripening stage.

(d) *Eradication of Kans*.—The field trials to eradicate *kans* with monsoon covers of green grass or *sann* hemp mentioned last year were completely successful. Besides achieving total eradication of the weed, the subsequent wheat crop on the former weed patches in each field grew better than in the surrounding area and gave higher yields of a better quality of grain with more straw. The organic matter content of the soil in these patches was found, after the harvest of the crop to be higher in the first six inches than in the soil from the rest of the field.

TABLE 60.

Influence of biological eradication of weeds on subsequent crop and soil.

	Mean yield. Lbs. per acre		% Mean composition (On oven dry basis)					
	Grain.	Straw	Soil organic matter		Grain.			
			0.6"	6.15"	Total nitro- gen	Albu- minoid nitro- gen	Gluten.	Starch.
Normal fields	427	672	0.07	0.70	1.85	0.82	8.04	49.23
Weed-eradicated patches	811	908	0.85	0.70	2.07	1.13	11.53	31.79

The method has now been adopted as a routine on the Institute Farm.

(e) *Poisoned Baits*—flat poison.—It is well known that rats soon learn to avoid poisoned baits of the usual types, this reduces their utility. After several trials it was found that the inclusion of animal grease and glue in the baits made them irresistible for much longer and they have proved most efficacious. Baits prepared in this way met with a wide demand.

Poisoned-bran bait for white ants and other insects.—The composition of this bait has also been improved. It was found to be very effective at Bharatpur and Bundi where the soil was irrigated after application. Two to three applications at 20 lbs. per acre were found necessary before white ants completely disappeared.

13. COMPOST MANUFACTURE.

Farm refuse.—Rain-watered compost was made on cultivators' fields in Jaipur and Jodhpur. The work was very well organized with the following results:

At Jaipur compost was made at twenty four places in twenty one villages distributed all over the State. The main materials used were kachra (village and farm refuse) kadds, ft. of raw materials was

Twenty-one cultivators compost. Of these six of such a rapid process cected to the extra space were indifferent.

At Tonk, in the same year, compost was made at five places. The quantity of raw compost yielded 85 per cent. by volume of finished product appears to be due to the extensive use of the product superior to his usual half rotted manure. The cultivators applied the compost to wheat fields. One of them reported increased yields. It was also used by one cultivator as a top-dressing for lucerne. Some of them preserved it for the kharif crops of 1936.

14 PUBLICATIONS

The following papers have been submitted for publication within the period of this Report —

An analysis of the efficiency of selection methods used in the improvement of Malwa cotton by J B Hutchinson and Kubersingh

* Genetic principles and the problem of cross breeding for milk yield in Indian cattle by J B Hutchinson and N R Joshi

* An examination of R D Boes's analysis of a serial experiment by J B Hutchinson and V G Panse

The introduction of improved strains of crop plants in Central India and Rayputana" by J B Hutchinson and V G Panse

Papers were read before the bodies named those marked with an asterisk have also been submitted for publication

At the Symposium on Disease Resistance in Plants held at Coimbatore in October 1935 under the joint auspices of the Indian Academy of Sciences the Association of Economic Biologists and the Society of Biological Chemists —

*Studies in Disease Resistance, I Cotton Wilt and Environment By K N Ambegaonkar and Yeshwant D Wad

*Studies in Disease Resistance II Leaf roll and Red leaf of American Cottons By I Madhusudan Rao and Yeshwant D Wad

Before the Agricultural Section of the Indian Science Congress during its 23rd Session at Indore in January 1936 —

1 Optimum number of buds for sugarcane sets	G C Tambe and S C Talesara
2 Biological eradication of kane	G C Tambe and Y D Wad
3 *Manuring of cotton for yield in Malwa	C K Chhaya and P M Kulkarni
4 Importance of complex designs in agronomical experiments.	S Shamsher Singh and P M Kulkarni
5 Treatment of sugarcane sets to improve germination and yield *Combined with No 1	G C Tambe and S C Talesara
6 The use of Revenue Settlement Records for agricultural workers	K A Singh L Swaroop and R K Aurangabdkar
7 Humus supply to irrigated arid soils ..	S Shamsher Singh and P M Kulkarni
8 Preparatory cultivation for wheat in Malwa ..	G C Tambe S C Talesara and L Swaroop
9 Cold weather cultivation of vacant fields and interculture of standing crops in Malwa	G C Tambe and S C Talesara
10 Comparative study of regional soils	L N Desai and S C Chakrabarty
11 *Root studies—their scope in Agronomy, I	N S Apte
12 *Root studies—their scope in Agronomy II	K M Simtote and R K Aurangabdkar
13 Influence of soil moisture relationship on crop growth	I M Rao R K. Aurangabdkar and B Goswami
14 Groundnut an investigation into its cultivation in Malwa	G C Tambe and S C Talesara
15 *Cotton yields as affected by soil condition and nutrients	S B Mogre and G T Shahane

16 "Efficient production of tobacco seed" S B Mogre and V. N. Bhargave

17 The relation between light and other factors in plant development I M Rao and S Ghosh

18 The influence of treatment and the cotton crop on the soil profile S C Chakrabarty and L N Desai

19 Cambodia cotton in Jaipur Tarnchand Kala and G K Sant

20 Soil texture, nutrition and staple length of cotton S B Mogre and Y D Wad

21 *Bajra* and *Tur* in Jaipur State K R Joshi T Kala and P M Kulikarni

22 Tobacco curing for bright leaf—ample adjustments S B Mogre and G T Shahane

23 Sugar beet—a possible cash crop for Central India and Rajputana I M Rao and S Ghosh

24 "Seed quality and crop vigour" R K Aurangabadkar and B Gowarani

25 "Cultivation of high quality paddy in unpuddled black cotton soils" C L Nagar T Krishna moorthi and P M Kulikarni

26 Sugarcane x sorghum crosses in Malwa and Rajputana O C Tambe S C Chakrabarty and V R Sathe

27 The possibility of the Sojabean crop in Central India R K Aurangabadkar and B Gowarani

28 Initial start to cotton seedlings with differing soils I M Rao and C L Nagar

Before the Medical and Veterinary Section during the same session —

(1) "The utilization of antiseptics and coagulants in composting habitation wastes" by M A Nicholson and S C Chakrabarty

(2) "The Indore process for disposing of habitation wastes at Alwar" by C L Nagar

A joint discussion of the Science C and Veterinary Sections and habitation wastes and its application

A letter to the Editor of *Nature* on the position of agricultural composts relative to that of inorganic fertilizers was published over the names of F K Jackson and Y D Wad

The following Bulletins and Leaflets have been published or reprinted —

Bulletin No 1—"The sanitary disposal and agricultural utilization of habitation wastes by the Indore process," by F K Jackson and Y D Wad (reprinted with additional matter)

Bulletin No 2—"The supply of humus to soils" by F K Jackson, Y D Wad and V G Panse (reprinted and revised)

Bulletin No 4—"Studies in the technique of field experiments" by J B Hutchinson and V G Panse

Leaflet No 12—"Eradication of Kans" (English)

Leaflet No 13—"The Indore method of sugarcane cultivation" (English)

Leaflet No 14—"Silage making from grasses in dry regions" (English)

THE WORKING OF THE FARM

15 FIELDS TRIALS

The following experiments were conducted —

Humus Supply—Incorporation of organic matter in the soil Green manure with weed eradication Improvement of water logged soils

Soil Improvements—Control of soil erosion by contour strips sowing and the use of arrester crops Effect on the succeeding crop of cultivation of land in winter at different depths by different implements Tests on the efficiency of different implements of interculture Seedling vigour and yield of cotton

Rotation—Rotation of crops Influence of previous crop on cotton

Associated growth of crops—Association of paddy varieties with cotton groundnut and tur.

Weed eradication — Eradication of woods by biological means

Treatment of seed—Treatment of sugarcane setts with lime water before planting

Multiplication of seed—Paddy 34 Varieties Soybeans 10 varieties Peas 4 varieties Hakuryu grass Onions 2 varieties Bananas 4 varieties *Brassica luxurians* Sorghum sugar cane hybrids 6 crosses Co. canes 14 varieties

Sugarcane—Pre treatment of cane setts *Germination of cane setts with varying numbers of each day* *in September and October*
1

Lucerne—L no sowing of lucerne with no irrigation *Lucerne* no sowing

Sugar beet—Comparison of the yields of local fodder carrots and sugar beets

Mangolds—Small growth trials 10 varieties

Tobacco -B ilk cropping of cigarette paper wrapper on Lukka varieties

Compost preparation of bone char—fixing the technique. Composting of cattle trishi for hort trials. Composting of cow dung alone—further trials.

16 CROPS AND YIELDS

	Yield in maunds per acre	
	Maximum	Minimum
Cotton Malvi 9	6 0	0 75
Groundnut Akola 10	16 22	3 40
Jowar Ramkot	13 95	10 30
Paddy Irrigated and Unirrigated I	4 90	
Tur	13 1	10 75
Gram	10 0	0 60
Linseed I	7 20	1 67
Wheat Malvi	9 35	2 50

Sugarcane
var. al. Field 38 II

	Ratoon 1935-36	Plant cane 1934-35
--	-------------------	-----------------------

Variety	S 44	702	319
	Co 251	670	445
	Co 213	702	461
	Co 210	712	531
	Co 270	760	610

Sugar-cane Sorghum hybrids Field 38 II

Co 351	716
Co 352	62
Co 353	600
Co 355	686
Co 356	464
Co 357	561

Sugarcane : normal F 32

Range of yield in mds
per acre

Co 291	603 to 673
Co 210	616 to 782
Co 213	938 to 1 270
Co 290	1 008 to 1 210

Sugarcane setts

Untreated	Treated with humic
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Co 290	712	1 012
--------	-----	-------

Sugarcane yield for whole area of 1 33 (11 acre)

Number of canes per acre	Yield in mds. per acre
--------------------------------	------------------------------

31 800	1,224
--------	-------

Irrespective of treatments

Excerpts—Agronomical experiments on maize in previous years did not bring out

The yield is given as follows:—

	lbs per acre
1949-50 Winter	13 424
Summer	12 278
Monsoon	11 727
Total	<hr/> 37 429

17. GENERAL.

(i) *Farm Bala*—There are now 13 pairs of bullocks among which two Kankreji pairs only survive of the original 1923 pair now the remainder having been bought in the last two years. The area of Mahrashtra land of average size as usually found with cultivation is

434 acres of arable land with no irrigated from the available farm wastes and 30 acres of irrigation land in the catchment area of the Tapti River block.

230 acres of grazing land all for sheep.

(ii) *Workshop*—The workshop staff were kept busy in repairing and maintaining the equipment of the laboratory, testing building roads etc.

(iii) *Medical Doctor*—as doctor's fees from the Farm amount to Rs. 6500 a marked increase took place over the last year when crop yields were lowered by adverse seasons.

(iv) *Free supply of seed, tools and help to cultivators*—Instruction was given in practical agriculture to still 1600 farmers in the following places, the periods ranging from a year to a few days.

If. Bharat State

S. Kanara State

Ajanta M. U. Mysore

Bhadravati (District Institute of Agriculture, C. P. and Municipality)

Mysore

Vidarbha State

Bihar State

Students from the Union College Indore were given

12 agricultural extension workers were frequently sent out for demonstration work. These extension agricultural officers

PROPAGANDA AND EXTENSION WORK IN STATES

18. VISIT TO STATES

During the year under report the Agricultural Adviser made fifteen visits to the States the Executive Officer sixteen, the Genetecist and Botanist two, the Chemist and Agronomist six and other staff thirty two.

19. INSTITUTE AND TRAINING FACILITIES.

No fixed courses are provided but practical training is given at the request of the Delegates or members of their Revenue and Agricultural staffs and selected cultivators the programme of instruction being varied in its items to suit individual cases. No fees are charged and free accommodation is usually provided in the Institute or Visitors' quarters.

Training both in improving farm refuse and household wastes was given to Agricultural and Sanitary Officials and sweepers from member States and outside, the latter process with the aid of the Indore Residential Area Authorities.

Lectures and demonstrations were given by the Extension Officer in district tours to large village audiences. He explained the advantages of growing good crop varieties, of increasing their manure supply by making rain watered compost from farm wastes, of turning over manure and so on, stage for their cattle either in pits or in multi-walled kilns, to suit the local conditions, of the practical possibility of improving their cattle by crossbreeding "scrub" bulls, the lower cost of making better quality gur by the McGlashan furnace and a variety of other improvements within the capacity of ordinary cultivators.

Ploughmen trained in building the McGlashan furnace and in gur making were placed at the disposal of the Darbars.

Assistance was also given by the Extension Officer in organizing demonstrations at Agricultural shows and cattle fairs in many of the States. Illustrative exhibits were provided, lectures delivered and cinematograph films shown of agricultural and rural uplift subjects accompanied by running commentaries.

Acknowledgment is due to the Indian Central Cotton Committee and the Central Publicity Officer, Railway Board for the free loan of films. Four films produced by the Institute are now ready for display and others are in preparation.

188 July 1936

F. K. JACKSON
Director

INSTITUTE OF PLANT INDUSTRY, INDORE

PROGRAMME OF RESEARCH WORK FOR 1936-37

Genetics and Botany Section

COTTON

(1) *Botanical Survey*.—Further work in the light of

- (a) information collected from old records
- (b) collection of medium staple cottons from short staple areas
- (c) the request of the Indian Central Cotton Committee for an investigation into the possibilities of improving Dholleras cotton

(2) *Genetics*.—Study of inheritance of major factors in Asiatic and Indian American cottons

Study of cases of abnormal inheritance of major factors

Study of the inheritance of quantitative characters.

Study of interspecific hybrids with special reference to the bearing of heterosis on plant breeding procedure

Study of the rate of mutation in mutable strains.

(3) Cytology—Study of sterile types derived from an interspecific hybrid (*G. arboreum* *G. herbaceum*)

Study of chromosome behaviour in F1, F2 and backcrosses of G. anomalous x cultivated *Aegle* cottons.

(4) Physiology—Study of cotton hair characteristics
Development of tests for lint quality suitable for the needs of the plant breeder
Study of relative selection values of four simple genotypes in Malwa and Nimir

(5) *Selection and Breeding*—Propagation and distribution of Malvi 9
 Study of variance in Malvi 1, Malvi 9, and the crosses between them, and re-selection for further propagation according to the results obtained
 Study of and rs selection in progeny rows of 1933 selections
 Study of problems of transference of herbaceous quality to Malvi type
 Study of Cambodia selections grown at Badnawar
 Study of selections in Nimir deshi made in 1933 and grown in 1934 at Dhamnod

(6) *Variety Trials*—Variety trials will be laid down at the Institute and in the territory of member States as found necessary in the light of results obtained from our present trials.

OTHER CROPS

Work on other crops will be largely confined to the selection and purification of desirable high yielding strains for the main areas served by the Institutes, and fundamental research will usually be restricted to cotton. Exceptions from this rule will occur from time to time when opportunities arise of solving general problems more easily than could be done on cotton and plant breeding material will of course, be used to the fullest possible extent to provide data of scientific value.

(1) Botanical—Comparative developmental study of durum and bread wheats
 (2) Genetics—Study of inheritance of certain characters in local durum wheats
 (3) Selection and Breeding—Selection and breeding work will be continued on the following crops—

<i>Kharif</i>	<i>Rabi</i>
Jowar	Wheat
Bajra	Barley
Tur	Gram
Tilli	Linseed
Niger	Kesari
Groundnut	Safflower

A part at least of the breeding material in these crops will be grown on the farms of member States.

(4) *Variety Trials*—Variety trials on all crops of interest to member States will be laid down in the light of information gained from the current season's experiments.

(2) *Lathyrism*—Work on *Kesari* is being continued and in connection with it the botanical and agricultural problems involved in the growth of the associated weeds responsible for lathyrism are being studied.

APPENDIX 3

THE BOMBAY COTTON CONTROL ACT, 1935

An Act to provide for the prohibition of the cultivation of Gogha cotton and the mixing of such cotton with other cotton and for the prohibition or restriction of the possession or use of or trade in Gogha cotton or cotton mixed with Gogha cotton.

WHEREAS it is expedient in the best interests of the growers of cotton in certain areas of the Presidency of Bombay, the cotton trade and the economic prosperity of the said Presidency to maintain the quality and reputation of the cotton grown in those areas and for that purpose to prohibit the cultivation of Gogha cotton and the mixing of such cotton with other cotton and to prohibit or restrict the possession or use of or trade in Gogha cotton or cotton mixed with Gogha cotton;

WHEREAS the previous sanction of the Governor General required by sub-section (3) of section 80A of the Government of India Act and the previous sanction of the Governor required by section 80C of the said Act have been obtained for the passing of this Act. It is hereby enacted as follows—

1. Short title and extent.—(1) This Act may be called the Bombay Cotton Control Act, 1935.

(2) It extends to the whole of the Presidency of Bombay.

2. Definitions.—In this Act, unless there is anything repugnant in the subject or context—

(a) Cotton includes cotton plant ginned and unginned cotton, cotton waste and

(b) Director of Agriculture means the officer appointed for the time being to be the Director of Agriculture.

(c) Gogha cotton means the kind of cotton known as *Gossypium herbaceum* (Parviflorum Gogha) and

(d) 'Controlled area' means an area specified in a notification under section 3.

3. Power to issue notification prohibiting the cultivation etc. of Gogha cotton.—The Local Government may, by notification in the *Bombay Government Gazette* in such local area and for such period as may be specified in the notification—

(a) prohibit the cultivation of Gogha cotton or

(b) prohibit the mixing of Gogha cotton with any other cotton or

(c) prohibit or restrict the possession or use of or trade in Gogha cotton or any other cotton mixed with Gogha cotton.

4. Penalty.—Any person who knowingly in contravention of the provisions of this Act or of any notification issued under section 3 or rule made under section 14—

(a) cultivates Gogha cotton shall on conviction be punishable with fine which may extend to rupees twenty for the first offence and to rupees fifty for every subsequent offence;

(b) (i) mixes or causes to be mixed Gogha cotton with any other cotton or

(ii) possesses uses or trades in Gogha cotton or any other cotton mixed with Gogha cotton,

shall on conviction, be punishable with fine which may extend to rupees five hundred for the first offence and to rupees one thousand for every subsequent offence.

5 Confiscation—Whenever an offence under this Act has been committed, all cotton in respect of which the offence has been committed and every box, receptacle, package or covering in which such cotton is contained shall be liable to confiscation.

6 Procedure in confiscation—(1) When in any case tried by a Criminal Court, the Court decides that anything is liable to confiscation under section 5 he may, after hearing the person, if any, claiming any right thereto and the evidence, if any, which he produces in support of his claim, order confiscation.

(2) When an offence under this Act has been committed and the offender is not known or cannot be found or when anything liable to confiscation under this Act is found and is not claimed by any person, the officer authorised by the Local Government in this behalf may hold an inquiry and may order confiscation.

Provided that no such order shall be made before the expiration of one month from the date of seizing the thing liable to confiscation or without hearing the person, if any, claiming any right thereto and the evidence, if any, which he produces in support of his claim.

7 Compounding—(1) The officer authorised under sub section (2) of section 6 may accept from any person who is reasonably suspected of having committed an offence under section 4 a sum of money as may be prescribed by rules made under section 14 by way of composition for such offence.

(2) On payment of such sum such person, if in custody, shall be set at liberty and if proceedings in any criminal court have been instituted against such person in respect of such offence the composition shall be deemed to amount to an acquittal and no further proceedings shall be taken against such person in respect of such offence.

(3) Notwithstanding anything contained in sub section (2), it shall be lawful for the court or the officer authorized under sub section (2) of section 6 to order confiscation of anything liable to confiscation under section 5.

8 Power of entry and seizure—(1) Any officer authorised in this behalf by the Local Government may between the hours of 6 a.m. and 6 p.m.—

(a) enter upon any land in a controlled area in which he knows or has reason to believe that Goghan cotton has been or is being cultivated in contravention of a notification under section 3, uproot or cause to be uprooted such cotton, and seize the cotton so uprooted, or

(b) enter upon or into any land, building, ship, vessel, vehicle or place in a controlled area in which he knows or has reason to believe that Goghan cotton or any other cotton mixed with Goghan cotton is kept in contravention of a notification under section 3, and seize such cotton.

(2) Every officer seizing any cotton under this section shall forthwith—

(a) make a memorandum of the facts leading to the seizure and forward it to the Director of Agriculture and

(b) subject to rules made under section 14, forward such cotton to the nearest officer authorised by the Local Government to receive it, for examination and for report to the Director of Agriculture.

(3) The opinion of the officer authorised under sub section (2) regarding such cotton recorded in any document signed by such officer shall be evidence as to the nature of such cotton in any inquiry trial or proceeding under this Act

9. *Duty of owner occupier and person in charge to give facilities for inspection by authorized officer*—(1) Every owner occupier or person in charge, of any land building ship vessel vehicle or place shall give all reasonable facilities to the officer authorised under sub section (1) of section 8 to inspect such land building ship vessel vehicle or place.

(2) Any person who contravenes the provisions of sub section (1) shall on conviction, be punishable with fine which may extend to rupees twenty

10. *Previous sanction and limitation for prosecution*—No prosecution under this Act shall be instituted without the previous sanction of the Director of Agriculture

11. *Cognizance of offences*—No criminal court inferior to that of a Presidency Magistrate or a Magistrate of the Second Class shall try any offence under this Act

12. *Protection for acts done under the Act*—No suit prosecution or other legal proceeding shall be instituted against any person for anything which is in good faith done or intended to be done under this Act

13. *Officer acting under the Act to be public servant*—Every officer acting or purporting to act in pursuance of the provisions of this Act shall be deemed to be a public servant within the meaning of section 21 of the Indian Penal Code

14. *Rules*—(1) The Local Government may make rules not inconsistent with the provisions of this Act for the purpose of carrying into effect the purposes of this Act

(2) In particular and without prejudice to the generality of the foregoing provision, the Local Government may make rules for all or any of the following purposes namely—

(a) to prescribe the sum of money to be paid by way of composition under section 7,

(b) to prescribe the conditions subject to which cotton seized may be forwarded under section 8,

(c) any other matter which is to be or may be prescribed

(3) Any such rule may provide that a contravention thereof shall be punishable with fine which may extend to rupees fifty

(4) The rules made under this section shall be subject to the condition of previous publication in the *Bombay Government Gazette*

I. (5) Rules made under this section shall be laid upon the table of the Bombay Legislative Assembly and shall be liable to be annulled if the rule shall after being examined to have been

APPENDIX VI.

BOMBAY ACT No IV OF 1936

(First published after having received the assent of the Governor General, in the "Bombay Government Gazette" on the 16th March 1936.)

*An Act to amend the Cotton Ginning and Pressing Factories Act, 1925
in its application to the Presidency of Bombay*

the Government of India Act have been obtained for the passing of this Act. It is hereby enacted as follows —

1 *Short title extent and commencement* —(1) This Act may be called the Cotton Ginning and Pressing Factories (Bombay Amendment) Act, 1936

(2) This Act shall extend in the first instance to the Province of Sind or such area in the said Province with effect from such date as the Local Government may by notification in the local official Gazette appoint. The Local Government may by notification in the local official Gazette extend the provisions of this Act to any other area with effect from such date as the Local Government may appoint in the said notification

2 *Amendment of section 2 of Act XII of 1925* —In section 2 of the Cotton Ginning and Pressing Factories Act 1925 hereinafter called the said Act —

(1) after the word, comma and dash context,—” the following shall be inserted namely —

“(aa) ‘admixture of cotton’ means a prescribed mixture of different varieties of cotton.” and

(2) after clause (f) the following clause shall be inserted, namely —

“(ff) ‘licence’ means a licence granted under section 2A ”

(3) after clause (h) the following clause shall be inserted, namely —

“(i) ‘Season’ means such period as may from time to time be prescribed ”

3 *Insertion of section 2A in Act XII of 1925* —After section 2 of the said Act, the following section shall be inserted, namely —

“2A *Licence for working cotton ginning factory or cotton pressing factory* —

(1) No cotton ginning factory or cotton pressing factory shall be worked without a licence granted to the owner thereof by such authority, in such form, subject to such conditions and on payment of such fee, as may be prescribed

(2) (a) A licence for which the prescribed fee has been paid shall be liable to be refused only on the ground that the owner or person in charge of a cotton ginning or cotton pressing factory in respect of which a licence is applied for has been convicted of an offence punishable under this Act

(b) A licence shall be liable to be suspended with drawn or cancelled only on the ground that the owner or person in charge of the cotton ginning or cotton pressing factory in respect of which it is issued or was granted has been convicted of an offence punishable under this Act.

Provided that no licence shall be suspended with drawn or cancelled under this section until after the expiration of the period in which the said owner or person has been so convicted.

(3) If any person works a cotton ginning or cotton pressing factory in respect of which a licence has not been granted or has been suspended withdrawn or cancelled such person shall be guilty of an offence

(a) on a first conviction with fine which may extend to five hundred rupees and if the offence has continued for more than one day with an additional fine which may extend to one hundred rupees for every day subsequent to the first day during which the offence has continued and

(b) on every subsequent conviction with fine which may extend to fifteen hundred rupees and if the offence has continued for more than one day with an additional fine which may extend to two hundred rupees for every day subsequent to the first day during which the offence has continued;

⁴ Amendment of section 3 of Act XII of 1925 In sub section (2) of section 3 of the said Act —

(1) the word 'and' shall be omitted and

(2) the following words shall be added at the end —

and the proscribed particulars as supplied by such person of the cotton ginning factory where it has been ginned.'

⁵ Insertion of new sections 3A, 3B and 3C in Act XII of 1925—After section 3 of the said Act the following new sections shall be inserted namely—

'3A. Prohibition of mixing of cotton with seed or foreign substance.—The Central Government may by notification specify in what areas in India cotton containing seed or foreign substance in excess of the prescribed proportion or containing any foreign substance, gins or presses or allows such cotton to be ginned or pressed in such factory, or

(2) Any owner of a cotton ginning or cotton pressing factory or any person in charge of such factory—

(a) who knowing or having reason to believe that any cotton is watered or contains seed in excess of the prescribed proportion or contains any foreign substance, gins or presses or allows such cotton to be ginned or pressed in such factory, or

(b) who in any area specified in the notification under sub section (1) gins or presses or allows to be ginned or pressed any cotton which he knows or has reason to believe to contain an admixture of cotton

shall on conviction, be punishable with fine which may extend to five thousand rupees.

(3) Any owner of cotton who knowingly waters any cotton which is ginned and which is being or is intended to be pressed in a cotton pressing factory, or mixes seed or foreign substance with such cotton, or in any area specified in

subsection (1) makes any admixture of cotton or abete or knowingly allows or connives at any such watering mixing or admixture of cotton shall on conviction be punishable with fine which may extend to five thousand rupees

Explanation—For the purposes of this section, cotton shall not be deemed to be watered unless such cotton contains moisture in excess of the normal quantity. The normal quantity of moisture in any given quantity of cotton is the amount of moisture that such cotton is reasonably expected to have regard being had to the

such cotton
A certificate
that a given
it possesses
if the latter

quantity exceeds the former it shall be evidence until the contrary is proved that the cotton is watered

or the contents of such package or bale to be examined by the prescribed person or body

(2) A certificate given by such person after examination of the contents of any bale under sub section (1) shall be admissible in evidence and be presumptive proof of the facts mentioned therein until the contrary is proved

3C Entry and inspection of the factory
gazetted officer to an
or cotton pressing f
contravention thereto
thereunder or of any
in respect of such factory and to seize all things in respect of which an offence
punishable under this Act appears to have been committed

(2) The owner or the person in charge of every cotton ginning or cotton pressing factory shall give every reasonable assistance to the inspecting officer in the performance of his duties under sub section (1)

(3) The owner or the person in charge of such factory shall, in every instance, be permitted to attend during the inspection and the things seized during such inspection shall be sealed in the prescribed manner"

6 Amendment of section 5 of Act XII of 1923—For section 5 of the said Act, the following section shall be substituted, namely—

"*5 Returns*—(1) The owner of every cotton ginning factory shall submit to the prescribed authority within each time and in such form as may be prescribed monthly returns showing the quantity of cotton ginned in the factory during the preceding month and from the commencement of the season to the end of that month.

2 The Local Government shall compile from the monthly returns submitted under sub section (1) and shall publish in such manner as the Governor General in Council may direct a statement showing the total quantity of cotton ginned in the province during the month and from the commencement of the season to the end of the month to which the returns relate

Provided that the quantity of cotton ginned in any individual factory shall not be published

(3) The owner of every cotton pressing factory shall submit to the prescribed authority, within such time and in such form, as may be prescribed, weekly returns showing the total number of bales of cotton pressed during the preceding week and from the commencement of the season to the end of that week, and the approximate average net weight of the bales pressed in that week.

(4) The Local Government shall compile from the weekly returns submitted under sub section (3), and shall publish in such manner as the Governor General in Council may direct, a statement showing the total number of bales pressed in the province during the week and from the commencement of the season to the end of the week to which the returns relate:

Provided that the number of bales pressed in any individual factory shall not be published.

(5) If default is made in submitting any return as required by sub section (1) or sub section (3), the owner of the factory shall, on conviction, be punishable with fine which may extend to fifty rupees.

(6) Where the owner of a cotton ginning or cotton pressing factory has notified to the prescribed authority that the work of ginning cotton or pressing bales in that factory has been suspended it shall not be necessary for the owner to submit returns under sub section (1) or sub section (3) until such work has been resumed "

⁷ Amendment of section 6 of Act XII of 1925.—In section 6 of the said Act, after the words "other than" the words and figures ' the standard weights and measures, weighing and measuring instruments authorised under the Bombay Weights and Measures Act, 1932, in districts or areas in which Parts II, III, V and VI of that Act are in force or elsewhere other than" shall be inserted.

⁸ Amendment of section 7 of Act XII of 1925.—In sub section (1) of section 7 of the said Act, after the words "for the purpose of sections" insert the figures and letters "3A, 3C".

⁹ Insertion of new section 11A in Act XII of 1925.—After section 11 of the said Act the following new section shall be inserted, namely—

"11A. Power of Magistrate contained in section 32 of the Magistrate or a Magistrate of any offence punishable under deemed to have been amended accordingly

10. Amendment of section 13 of Act XII of 1923.—(1) In section 13 of the said Act, after clause (a), the following clauses shall be inserted, namely—

"(sqd) what shall constitute an admixture of cotton;

(ab) the period which shall from time to time constitute a season.

(ac) the authority by whom, the form in which, the conditions subject to which and the fees on payment of which, a licence may be granted under sub-section (1) of section 2 A,

(ad) the particulars of the cotton ginning factory to be entered in the register maintained under sub section (2) of section 3.

(ae) the proportion of seed which may be contained in cotton;

(af) the person authorised to give a certificate regarding the quantity of moisture contained in any cotton and other matters specified in section 3 A,

(ag) the person authorised to examine bales under section 3 B,

(ah) the procedure for making a complaint and causing the contents of a bale to be examined and the fee for examination of the contents of a bale under sub section (1) of section 3 B,

(ai) the manner in which the things seized shall be sealed under section 3 C."

(2) Section 13 of the said Act shall be renumbered as sub section (1) of that section and after the sub section so renumbered, the following sub sections shall be added, namely —

"(2) The rules to be made under sub section (1) shall be subject to the condition of previous publication

2 Jan 1931

Provided that when, in the opinion of the Local Government, such modification or rescission is likely to defeat or frustrate any of the purposes of this Act, the Local Government may, by notification in the local official Gazette, declare that the modification or rescission shall have no effect and thereupon the rule shall remain in force as if it had not been modified or rescinded."

11 *Addition of sections 16 and 17 in Act XII of 1925* — After section 15 of the said Act, the following sections shall be added namely —

16 *Penalty* — Whoever contravenes any of the provisions of this Act or any rule made thereunder —

17 *Compounding off*
any person whose licence is
Act, or who is reasonably
a sum of money in lieu of
composition for the offence which may have been committed, as the case may be

(2) On payment by such person of such sum to the District Magistrate, such person if in custody shall be set at liberty and if criminal proceedings shall have been instituted against such person the composition shall be held to amount to an acquittal."

12 *Amendment of sections 3, 4, 6, 7, 8 and 9 of*
and (6) of section 3, in sub section (2) of section
sub section (3) of section 7, in sub section (2) of
section 9 of the said Act for the words 'shall b
conviction, be punishable' shall be substituted

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APPENDIX VII.

As Passed by the Legislative Council

CENTRAL PROVINCES BILL No 33 OF 1935

THE COTTON GINNING AND PRESSING FACTORIES (CENTRAL PROVINCES AMENDMENT) BILL 1935

*A Bill to amend the Cotton Ginning and Pressing Factories Act, 1925,
in its application to the Central Provinces*

Preamble—Whereas it is expedient to amend the Cotton Ginning and Pressing Factories Act, 1925, in its application to the Central Provinces in the manner hereinafter appearing,

And whereas the previous sanction of the Governor General required under sub-section (3) of section 80 A of the Government of India Act has been obtained to the passing of this Act,

It is hereby enacted as follows—

1. Short title and commencement—(1) This Act may be called the Cotton Ginning and Pressing Factories (Central Provinces Amendment) Act 1936

(2) It shall come into force on such date as the Local Government may by notification appoint in this behalf

1 A. Amendment of section 2 of Act XII of 1925—In section 2 of the Cotton Ginning and Pressing Factories Act, 1925 (hereinafter referred to as the said Act)—

(i) after the word, comma and dash context— the following shall be inserted, namely—

(aa) admixture of cotton means a prescribed mixture of different varieties of cotton

(ii) after clause (f) the following clause shall be inserted, namely—

(f) licence means a licence granted under section 2 A

(iii) after clause (h), the following clause shall be inserted, namely—

(i) season means such period as may from time to time be prescribed

2. Insertion of section 2 A in Act XII of 1925—After section 2 of the said Act, the following section shall be inserted, namely—

2 A. Licence for working cotton ginning factory or cotton pressing factory—
(1) No cotton ginning factory or cotton pressing factory shall be worked without a licence granted to the owner thereof by such authority, in such form, subject to such conditions and on payment of such fee as may be prescribed

(2) Whoever contravenes the provision of sub-section (1) shall be punishable with fine which may extend to five hundred rupees or, if he has previously been convicted of an offence under sub-section (1) to fifteen hundred rupees.

(3) No licence for which the prescribed fee has been paid shall be refused suspended or cancelled except on the ground that the owner or person in charge of the factory concerned has been convicted for the contravention of the provisions of section 3 A."

Provided that no licence shall be suspended or cancelled under this sub section until after the expiration of the season in which the said owner or person has been so convicted.

2 A *Amendment of section 3 of Act XII of 1925*—In sub section (2) of section 3 of the said Act—

(1) the word 'and' shall be omitted, and

(2) the following words shall be added at the end, namely —

" and the prescribed particulars as supplied by such person of the cotton ginning factory where it has been ginned."

3 *Insertion of sections 3 A, 3 B and 3 C in Act XII of 1925*—After section 3 of the said Act, the following sections shall be inserted, namely —

3 A *Prohibition against watering, etc., of cotton*—(1) This Local Government may by notification, declare that in any area specified in such notification no cotton which is ginned or pressed in a cotton ginning or cotton pressing factory shall contain any admixture of cotton

(2) Any owner of a cotton ginning factory or any person in charge of such factory who knows or has reason to believe that any cotton ginned in such factory contains seed in excess of the prescribed proportion or contains any foreign substance shall, on conviction be punishable with fine which may extend to fifteen hundred rupees

(3) Any owner of a cotton pressing factory or any person in charge of such factory who knowing or having reason to believe that any cotton is watered or contains seed in excess of the prescribed proportion or contains any foreign substance, presses or allows such cotton to be pressed in such factory shall, on conviction, be punishable with fine which may extend to fifteen hundred rupees

(4) *Amendment of section 3 A*

(5) Any owner of cotton who knowingly waters any cotton which has been ginned and which is being or ~~is being~~ or mixes seed or foreign sub
sub section (1) makes any ac
connives at any such watering
be punishable with fine which may extend to fifteen hundred rupees

be
The

3-B Examination of cotton, packages or bales—(1) The Local Government or any gazetted officer authorized by it in this behalf may on its or his own motion or on receipt of a complaint that there has been a contravention of the provisions of section 3 A in respect of any cotton, package or of any bale and in the case of a complaint, on payment of the prescribed fee by the complainant, cause such cotton or the contents of such package or bale to be examined by the prescribed person or body.

(2) A certificate given by such person or body after examination of the contents of any bale under sub section (1) shall be admissible in evidence and be presumptive proof of the facts mentioned therein until the contrary is proved.

3-C Entry and inspection—(1) The Local Government may authorize any gazetted officer to enter into and inspect, at any reasonable time, any cotton ginning or cotton pressing factory, for the purpose of ascertaining whether there is any contravention therein of any of the provisions of this Act or of any rule made thereunder or of any of the conditions subject to which a licence has been granted in respect of such factory, and to seize all things in respect of which an offence punishable under this Act appears to have been committed.

(2) The owner or the person in charge of every cotton ginning or cotton pressing factory shall give every reasonable assistance to the inspecting officer in the performance of his duties under sub section (1).

(3) The owner or the person in charge of such factory shall, in every instance, be permitted to attend during the inspection and the things seized during such inspection shall be sealed in the prescribed manner.

4 Amendment of section 5, Act XII of 1925—For section 5 of the said Act, the following Section shall be substituted, namely—

"**5 Returns**—(1) The owner of every cotton ginning factory shall submit to the Local Government in such manner as the Governor General in Council may direct, weekly returns showing the quantity of cotton ginned in the factory during the week.

(1 A) The Local Government shall compile from the weekly returns submitted under sub section (1) a statement showing the total quantity of cotton ginned in the factory during the season to the end of that week.

Provided that the quantity of cotton ginned in any individual factory shall not be published.

"**5 Returns**—(2) The owner of every cotton pressing factory shall submit to the Local Government in such manner as the Governor General in Council may direct, weekly returns showing the quantity of cotton pressed in the factory during the week, and the approximate value of the cotton so pressed.

(3) The Local Government shall compile from the weekly returns submitted under sub section (2), and shall publish in such manner as the Governor General in Council may direct, a statement showing the total number of bales pressed in the province during the week and from the commencement of the season to the end of the week to which the returns relate.

Provided that the number of bales pressed in any individual factory shall not be published

(4) If default is made in submitting any return as required by sub section (1) or sub section (2), the owner of the factory shall be punishable with fine which may extend to fifty rupees.

(5) Where the owner of a cotton ginning factory or a cotton pressing factory has notified to the prescribed authority that the work of ginning cotton or pressing bales in that factory has been suspended, it shall not be necessary for the owner to submit returns under sub section (1) or sub section (2) until such work has been resumed "

4 A Amendment of section 7 of Act XII of 1925.—In sub section (1) of section 7 of the said Act, after the words "for the purposes of sections" insert the figures and letters '3 A, 3 C'.

5 Amendment of section 13, Act XII of 1925.—In section 13 of the said Act after clause (a), the following clauses shall be inserted, namely—

- (aa) what shall constitute an admixture of cotton,
- ab) the period which shall from time to time constitute a season,
- ac) the authority by whom the form in which, the conditions subject to which the fee on payment of which, a licence may be granted under sub section (1) section 2 A,
- (ad) the particulars of the cotton ginning factory to be entered in the register maintained under sub section (2) of section 3,
- (ae) the proportion of seed which may be contained in cotton,
- (af) the person authorized to give a certificate regarding the quantity of seed contained in any cotton and other matters specified in section 3 A,
- (ag) the person or body authorized to examine bales under section 3 B,
- (ah) the procedure for making a complaint and causing the contents of a bale to be examined and the fee for examination of the contents of a bale under section (1) of section 3 B,
- (ai) the manner in which the things seized shall be sealed under section 3 C'

5 A. Amendment of section 13 of Act XII of 1925—Section 13 of the said Act shall be renumbered as sub section (1) of that section and after the sub section so renumbered the following sub sections shall be added, namely—

(2) The rules to be made under sub section (I) shall be subject to the conditions of previous publication.

(3) A copy of the draft of the memorandum to the Central Bank of the new Governor for the time being.

5. *Addition of section 16, in Act XIII of 1925*—After section 15 of the said Act, the following section shall be added, namely—

"16. Whoever contravenes any of the provisions of this Act or any rule made thereunder or any of the conditions subject to which a licence has been granted to him shall, on conviction, if no other penalty is already provided in this Act for such contravention, be punishable with fine which may extend to five hundred rupees, or, if he has previously been convicted of an offence under this Act or any rule made thereunder, with fine which may extend to fifteen hundred rupees."

APPENDIX VIII.

THE UNITED PROVINCES COTTON PEST CONTROL BILL

A Bill to Provide for the Proper Treatment of Cotton Seed

Preamble—Whereas it is expedient to provide for the proper treatment of cotton the larva of the moth Il worm, and whereas under sub section (3) this Act, it is hereby enacted as follows —

1 *Short title, extent and commencement*—(1) This Act may be called the Cotton Pest Control Act

(2) It extends to the whole of the United Provinces of Agra and Oudh

(3) It shall come into force on such date or dates and in such parts of the United Provinces as the Local Government may by notification in the *Gazette* from time to time direct

2 *Definitions*—In this Act, unless there is anything repugnant in the subject or context—

- (a) "Controlled area" means any part of the United Provinces in which the Act is in force by virtue of a notification issued under sub section (3) of section 1,
- (b) "Prescribed" means prescribed by or under rules framed under this Act,
- (c) "Raw cotton" means the unginned bolls of the cotton plant,
- (d) "Seed" means the seed of the cotton plant,
- (e) "Hand ginning" means ginning by means of apparatus operated by human power,
- (f) "Treat" with its grammatical variations and cognate expressions means to subject seed to a prescribed process for the purpose of freeing it from infection by a pest

3 *Ginning of raw cotton*—In any controlled area every owner of raw cotton whether produced in or imported into that area, shall cause it to be ginned before such date as shall be prescribed being not later than the sixteenth day of March next following such production or importation

Provided that a date not later than the first day of April may be prescribed as the latest date by which such raw cotton may be hand ginned

4 *Treatment of seed*—Subject to the provisions of section 8 every owner of seed in any controlled area whether such seed has been produced in or imported into that area and every person who has undertaken the ginning of any raw cotton on behalf of another shall before a date which shall be prescribed, being not later than seven days after the prescribed date first referred to in section 3 cause such seed to be treated by such method as shall be prescribed

Provided that for the purpose of treatment of seed by exposure to the heat of the sun the date prescribed shall be not earlier than the first day of April nor later than the fifteenth day of May

5 Prohibition against disposal of untreated seed—No person shall sell or otherwise dispose of any seed which has not been treated in the prescribed manner.

Provided that untreated hand sown seed may be sold or otherwise disposed of between the 1st day of October in any year and the 15th day of March next following.

6 Prohibition against sowing of untreated seed—No person shall sow or cause to be sown any seed which has not been treated in accordance with the provisions of section 4.

7 Import of seed into controlled area—(1) No person shall import or cause to be imported any seed into a controlled area except by railway and in closed waggons and except in accordance with the terms of a licence issued under this Act.

Provided that this sub section shall not apply to seed conveyed by railway through such area in closed waggons and not unloaded at any place within the area except for the purposes of transhipment in the ordinary course of transit.

seed and seed into a controlled area after its arrival within days to be specified in I to the said place and

seed imported into a controlled area

(3) The treatment provided for by sub section (2) shall be completed—

(a) in the case of any seed imported after the fifteenth day of September in any year and on or before the prescribed date first referred to in section 3—within fourteen days of its arrival at the place specified in the licence, subject to the provision that the treatment shall be completed not later than hours after the prescribed date aforesaid, and

(b) in the case of any seed imported before the fifteenth day of September in any year and not

9 Export of raw cotton—The Local Government may prohibit, during such periods as may be specified therein, the export of raw cotton from any controlled area, except in accordance with the terms of a licence issued under this Act.

10 Maintenance of registers—Every person who undertakes the treatment of seed otherwise than by exposure to the heat of the sun shall maintain such records, register and accounts as may be prescribed.

11 Appointments and powers of Inspectors—(1) The Local Government may appoint such persons as it thinks fit to exercise all or any of the powers and perform all or any of the duties assigned to an inspector by this Act or by rules made thereunder.

and may define the local limits within which such powers and duties may be exercised and performed

(2) An inspector may, subject to such rules as may be made in this behalf —

- (i) enter and inspect all places in which any business connected with the ginning or sale of raw cotton or the treatment or sale of seed is carried on,
- (ii) examine any machinery installed for the treatment of seed,
- (iii) examine any seed (before or after treatment) for the purpose of ascertaining whether it has been effectively treated
- (iv) examine any records or registers or accounts the maintenance of which is prescribed
- (v) enter and search without warrant any premises in which he has reason to believe that raw cotton or seed is being kept in contravention of this Act or the rules framed thereunder provided that no such entry and search shall be made except by, or under the written authority of, an inspector who is a gazetted officer,
- (vi) exercise such other powers as may be prescribed

12 *Penalties*—Whoever does any act or without reasonable cause omits to do anything in contravention of the provisions of any of sections 3 to 8 and 10 or of the orders issued under section 9 shall be liable on conviction before a Magistrate of the first class—

- (a) for a first offence or for a second offence in contravention of the same section—to a fine not exceeding two hundred rupees and
- (b) for a third or subsequent offence in contravention of the same section—to a fine not exceeding five hundred rupees

Provided that when any person is convicted of a first offence in contravention of any of the said sections the Magistrate may instead of sentencing him to a fine release him after admonition

13 *Orders by Magistrate for disposal of raw cotton or seed in respect of which an offence has been committed*—(1) Whenever any person has been convicted of an offence consisting of an act or omission in contravention of—

- (a) Section 3
- (b) Section 4
- (c) Section 6 or
- (d) Sections 7 or 8

The Magistrate at the time of passing sentence or of releasing the offender after admonition shall also pass an order directing the offender—

In case of (a) as aforesaid to cause the raw cotton in respect of which the offence has been committed to be ginned and the seed so obtained to be treated within such time as shall be specified in the order,

In case of (b) as aforesaid either to cause the seed in respect of which the offence has been committed to be treated within such time as shall be specified in

the order or to cause it to be removed from the controlled area concerned within twenty four hours.

in case of (c) as aforesaid, to cause the land in respect of which the offence has been committed to be ploughed over within such time as shall be specified in the order, or

in case of (d) as aforesaid, to cause the raw cotton or seed in respect of which the offence has been committed to be removed from the controlled area concerned within twenty four hours.

(2) If the offender has failed to comply with the order passed by the Magistrate under sub section (1) within the time so fixed, the Local Government may empower such officer as may be empowered in this behalf, in his discretion, in case of (a), (b) or (d) to cause the raw cotton or seed in respect of which the offence has been committed to be removed from the controlled area concerned by burn shall be in the manner in which such officer may have been sentenced.

14. Power to make rules.—(1) The Local Government shall make rules consistent with this Act in respect of the following matters, namely—

- the fixing of dates by which raw cotton shall be ginned, the authorities by which such dates shall be fixed and the manner in which they shall be published,
- the fixing of dates by which seed shall be treated, the authorities by which such dates shall be fixed and the manner in which they shall be published and
- the methods by and the manner in which seed shall be treated.

(2) The Local Government may make such rules in respect of other matters as may be necessary for the purpose of carrying into effect the provisions of this Act.

(3) In particular and without prejudice to the generality of the power conferred by sub section (2) such rules may provide for—

- the conditions on and circumstances in which an area may be declared to be a controlled area;
- the delegation of powers by the Local Government to such officers as may be appointed by it;
- prescribing the authority by whom and the manner in which a licence may be issued for the export of raw cotton from a controlled area;
- the maintenance of records, registers and accounts according to the provisions of section 10;
- the appointment of inspectors and the exercise by them of the powers conferred by section 11 and the conferring on them of such other powers as may be necessary for the purpose of this Act;
- the empowering of officers to carry out the orders of a court under sub section (2) of section 13 and the manner in which such orders shall be carried out; and
- the delegation of its powers by the Local Government.

(4) All rules made under this section shall be subject to the condition of previous publication

(5) All such rules shall be published in the *Government Gazette* and shall, unless some later date is appointed, come into force on the date of such publication

16 Protection to persons acting under this Act—No suit, prosecution or other legal proceeding shall lie against any person for anything which is in good faith done or intended to be done under this Act

STATEMENT OF OBJECTS AND REASONS

The cotton crop of the United Provinces is subject to attack by the caterpillar of the moth *Platyedra gossypiella* Saund., commonly known as the Pink Boll worm of cotton. The larva is carried over from season to season in cotton seeds which the caterpillar hollows out and in which it lies dormant until the favourable conditions produced by the monsoon bring forth the moth, the latter lays its eggs on the cotton plant and the larvae when they emerge find their way into the cotton buds or bolls.

2 This pest destroys upwards of 25 per cent of the crop in normal years and in some years reduces the return to the grower by half, the normal loss to the cultivator is estimated at from Rs 10 to Re 15 per acre. Further, the intensity of this infestation coincides with the period of development of most of the bolls in varieties of cotton of greater lint length and better spinning quality, thus preventing the profitable growth of better varieties in the province. It is therefore necessary to control the pink boll worm pest to enable cotton to be more extensively and profitably grown.

3 As a result of continued research it has been ascertained that the treatment of all cotton seed by heating it to an appropriate temperature diminishes the attacks of this pest, with consequent increase in yield. It is possible to deal with small village stocks by exposing cotton seed to the heat of the sun for two hours in April and May. But other methods are available. Heating

of the cotton industry in the province

J P SRIVASTAVA,
Minister for Education

NOTES ON CLAUSES

Clause 3—Experience has shown that unginned cotton cannot be conveniently or satisfactorily treated, accordingly it is proposed that ginning should be completed by a particular date so that the seed may be effectively treated at the proper time. The exact date would vary according to the season and locality and the variety of cotton grown.

and it is therefore proposed to leave the notification of this date to be prescribed by rules and only to mention the latest date in the Act itself.

Clause 4.—It is necessary that all seed within a controlled area should be treated in such manner as to prevent any possibility of its serving as a source of reinfestation of the new crop. It is also necessary that the treatment should not damage the seed.

It is proposed to leave the method of treatment to be determined under the rules of the Act. At present the most satisfactory known methods of treatment are by sun heat or by steam heating apparatus. Future research in India or elsewhere may however discover other and more economical methods, e.g. electrical treatment. A greater degree of flexibility is attained in the choice of methods if the matter is left to be decided by rule than if specific reference is incorporated in the Act itself. Moreover, it will then be easier to allow discretion to factories to put up such heaters as they think suitable, provided they comply with the requirements of the rules.

It is necessary to fix a final date for the treatment of seed to ensure that there shall be no serious danger of reinfestation of the planted crop through the emergence of moths from untreated stocks. Periods of moist heat, such as occasionally occur from April onwards stimulate the emergence of the adult insects. It is therefore proposed to provide for such fixation of date as would combine the maximum of protection compatible with practicable treatment.

Sun heat is generally not strong enough for seed treatment before April 1, is therefore proposed as the earliest date to be notified for such treatment. It would be desirable that all the ~~seed~~ ^{seed} be treated by April 15 if this may not be practicable. The purpose In practice to under the rules, the main or irrigation In any case t

In normal practice factory ginned seed would be treated within a few hours of ginning. A margin of seven days is suggested to safeguard granaries in the event of their seed treatment being in arrears of their ginning. It is intended that the date actually

Clause 5.—It is essential to the smooth working of any scheme of control that no stocks of 1-4-1 should be allowed to issue from the gunnery store. The amount only be determined by officers and men. There is no danger

Clause 6.—The sowing of untreated seed has to be prohibited if the pest is to be brought under control.

Clause 7.—The importation of raw cotton after the close of the factory ginning season would be a serious menace, and has no commercial justification. If required to augment the seed supply, the necessary seed can be imported as such.

Clause 8.—It is necessary to preclude reinfestation of a controlled area by the introduction of infested seed. It is therefore proposed that control should take the form of licence to import, which will be issued by the Collector or other officers to whom powers have been delegated for the purpose.

Seed certified to have been treated in another controlled area will be under no restrictions. Untreated seed must be treated effectively and reasonably quickly and there must be adequate safeguards against reinfection prior to treatment. These requirements are met by permitting import by rail only, and to places in which treatment facilities are available and have been arranged for by the importer, by importing in sound bags, and by limiting the time the seed may be held pending treatment.

Importation of untreated seed by road has to be absolutely prohibited. The dangers of reinfection from such a source are obvious, both by escapes during transit and by possible leakages en route.

Clause 9—It has been urged on behalf of ginners that if they have to bear the cost of the treatment of cotton seed they can only do so by increasing their ginning charges. The latter may result in cultivators taking their raw cotton outside the controlled area for ginning purposes. Accordingly, it is provided that the Local Government may by order prohibit the export of raw cotton from the controlled area, except under licence during such periods as may be specified. Normal trade relations will not thus be affected.

Clause 10.—It is necessary that all persons who engage in power ginning of kapas should maintain sufficient records of the kapas received for ginning, of the treatment of the kapas, and of the cotton produced, so as to enable a check to be maintained on the quality of the cotton produced. The maintenance of such records is included in the Cotton Control Act, 1948, and only applies to such ginning factories as may be necessary here to be registered.

may be necessary has to be provided for

Chap 11 T

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650 *S. S. JAIN*

A to the quantized

their status

APPENDIX IX.

PROGRESS IN THE INTRODUCTION OF IMPROVED VARIETIES OF COTTON

Boxbar—Broach Tract.—The group which was taken up last year within the policy of growing so called Selection I A A.L.P. during the previous year as a result of damage due to frost; this group accordingly excluded from the Departmental supervision during 1933-36 as a result of which the controlled area was reduced from 23,751 acres to 12,826

Out of 1,053,411 lbs of 1027 A L F seed purchased last season 289,616 lbs were supplied to Chhota Udrapur and the remaining 795,793 lbs were distributed from 20 depots in the Surat tract. Besides, the Hansot Co-operative Cotton Sale Society supplied 32,493 lbs. seed direct to its members, the total quantity of seed distributed thus being 1,118,906 lbs. The Rajpipla and Baroda States obtained their requirements of seed locally.

District - ~~Administrative~~ District - has the total area of 188,605 acres under cotton in
this district.
Department
and offices.

Yield per acre under Banilla cotton was 9,360 lbs.

... the cost of the Deccan Canals, etc., during the year

is arranged by the Department of Health and

400 lbs. of lint per bale
can Central Cotton Company - 400 lbs.

A seed distribution scheme of the Indian Cotton Council in this district and under it a total area of about 20,000 acres was organized for the multiplication of pure seed and 825,000 lbs. of seed were stocked for distribution in the sowing season. Banilla cotton has been found to give higher yield and to be of better quality in the black soils of the Tapti belt than in the lighter types of soils.

KUMRIA - Dharwar Troot. - The work of introducing two improved varieties of cotton, viz., Jayavant and Godavari No. 1, was carried out on an extensive scale through the Hubli and Gadag Cotton Sais Societies, with the aid of funds provided by the Indian Central Cotton Committee. The reserved area maintained for multiplying pure seed free

seed of Jayawant cotton at the Hnb¹ and that of Gadag No 1 at the Ga the previous year. The quantity areas was 1 281,670 lbs of Jayawan 128,167 and 103,680 acres, respect. during 1936-37

For distribution of general pedigree seed stocked by the Co-operative Cotton Sale Societies, seed depots were opened as usual in different selected centres. The general area grown with pure seed was 118,423 acres for Jayawant cotton as against 126,256 acres last year, and 58,434 acres for Gadag No. 1 cotton against 65,238 in the previous year. The estimated yield of Jayawant was 13,020 bales as against 15,000 bales last year, and 7,800 bales of Gadag No. 1, as against 4,600 bales in the previous year.

The Hubli Sale Society also sent outside its area of operation 590,100 lbs of Jayawanti seed enough for 59,010 acres. The total area under ~~more than~~ therefore, 177,433 acres as against 191,336 acres is distributed 84,163 lbs of Gadag No 1 seed, enough of operation. The total area under Gadag No 1,

With a view to spread Jayawant cotton in other areas, separate seed multiplication blocks of 5,847 acres at the Athani centre, 933 acres at Balihongal and 500 acres at Bagalkot were organised. 476,000 lbs of pedigree seed, enough for 47,600 acres, have been stocked for distribution during 1936-37.

Jahangirnath Mukherjee

a of seed cotton (1344
the Athani centre the
(1,344 lbs) over local

(a) Sind deshi, (b) Sind American, (c) Imported Egyptian and Sea Island cottons.

Among each of these three main classes the Department of Agriculture in Sind has, by botanical selection, evolved unimproved strains which on account of better yield, high ginning outturn or superior quality, are suitable for extension in general cultivation in the different cotton growing tracts of the Barrage areas.

Sind Deshi Cotton—This cotton has a special market of its own.

result in was 463.83 $\frac{1}{2}$ acres (including Khampur State) with an estimated outturn of 189,800 bales

Sind American Cotton.—This cotton occupied in 1835-36 about 378,075 acres out of the total cotton area of 841,909 acres. 4F cotton has been evolved. These are grown in Sind. It has been attacked by the latter, but as the latter have not yet been able to attack their cult., and jassid attack their cult. by the Agricultural Department are definitely superior to original material from which

Sind American 4F 98—This cotton has a staple length of $\frac{7}{8}$ " to 15/16" and spines 34's counts; it gives a high yield and has a ginning outturn of 33 per cent. Thus strain

forms the bulk of the crop in the new cotton growing areas on the Right Bank of the Indus where it has been found to be the most suitable type for cultivation.

Sind Sudhar (259F 1)—This improved strain has a staple of 1" 1 1/16" long and spins 40 s. It has a ginning percentage of 29.30 and in normal years is a very high yielding variety. It is resistant to bollworm attack and can withstand the heat as the being

The economic side of the question, which is of primary importance to the grower depends largely upon the prices prevailing for the various types of cotton. During 1935 these cottons were sold in large quantities both in Karachi and Bombay at the following rates—

SALE OF COTTON LINT IN 1935-36

	Price per candy of 784 lbs	Premium over Broach			REMARKS
		Rs	a	p	
SIND N R (21 W N)	171 8 3				Karachi delivers
SIND AMERICAN —					
4F 98	206 10 10	19	10	10 on 187	
285F 2	225 15 0	39	15	0 on 187	Bombay delivery
Sind Sudhar	207 0 0	80	0	0 on 187	
SIND EGYPTIAN AND SEA ISLAND—					
Bro. III 16	337 0 0	150	0	0 on 187	"
Sea Island 2 4	337 0 0	150	0	0 on 187	"

For successful cultivation of long stapled and fine quality cottons it is necessary to evolve a reliable marketing organization which will secure adequate premium for quality from the trade. Indian mills have of late shown considerable interest in these long stapled cottons and in order to ensure future supplies it is for them to encourage their production by offering the requisite premiums. The growers of Sind American cotton, as also the ginners are in constant fear of not getting an adequate price for staple cotton marketed in pure conditions.

MADRAS—I. *The Southern Tracts*—(A) Cambodias—Combatore—(1) The multiplication of pure Co. 2 Cambodias cotton seed for distribution to cultivators continued as usual through the annual contract of seed farms with co-operative seed societies and

year.

(ii) P
operative
152,000 -

scope for

(iii) Cambodia—Trichinopoly.—In the Trichinopoly District 59,069 lbs of Co. 2 Cambodia seed were distributed to the ryots by the Agricultural Department, as against 21,700 lbs distributed in the previous year. The area covered by this variety during the year was 6,090 acres.

(iv) Cambodia—Madura.—The area under Cambodia seed farms (Co. 2, 920 and 1267) was 175 acres from the

45,031 acres

(B) Karunganni—Coimbatore.—(i) The multiplication of C.7 Karunganni strain of Tirunelvelly tract which has become popular in the Coimbatore District was continued throughout the year.

Karunganni—South.—(i) The area under Karunganni strains C.7, A.10 and KPT. 1 seed farms was 1,907 acres as compared to 1,900 acres in the previous year. KPT. 1 (Strain No. 1)

(ii) In the Trichinopoly District, 3,270 lbs. of C. 7 Karunganni seeds were distributed to the ryots, about 695 acres were sown to this cotton.

II. NORTHERNS AND WESTERNS TRACT.—A. Northern.—(N. 14).—The seed farms under N. 14 variety were again started at the instance of Messrs. Bunny & Co., on an area of about 90 acres distributed in the talukas of Nandyal, Koilkuntla and Sirvel of the Kurnool District where this variety was reported to thrive better than in other talukas in the tract. The average yield of kapas per acre during 1935-36 was 200 fbs. as compared to an exceptionally good yield of 350 lbs during 1934-35. The premium paid by Messrs. Bunny & Co. that year was Rs. 30 per candy of 500 lbs. against Rs. 10 to Rs. 15 in the

previous year. There is now on hand a stock of seed sufficient to sow about 1,000 acres during the next sowing season. The area of natural spread under this variety is reported to be about 2,280 acres.

B. Westerns—H. 1 strain—The seed farm during 1935-36 was concentrated in nine villages round about Guntakal and consisted of 3,260 acres against an area of 3,588 acres in the previous year. Due to adverse seasonal conditions and consequent low

Central Provinces and Berar—The outstanding feature of the year was the
Grown

Guntakal Provinces—C. 400—Over 1,400 acres of this strain were grown in the

C. 402 combines improved fibre quality with high ginning percentage and is regarded by the local mills as superior to Broach.

C. 520—This selection continues to spread on account of its early maturity, high yield and high ginning percentage, the fibre properties are much superior to the average Bengals.

PUNJAB—(i) The total area under American cotton in British districts was 1,305,500 acres of which 4 F was grown on 1,118,900 acres and 289 F on 64,600 acres. 43 F, a new early maturing cotton recently evolved by the Cotton Research Board, was grown on an area of 6,000 acres, it is estimated that the area under this cotton will rise to over 25,000 acres during 1936-37.

**— Province (excluding Inian
the greater proportion**

(ii) **47-F**—This is a new variety and has all the desirable characters. The plant is very sturdy. In the last three years the yield of this

(iii) Desi Cotton—With a view to improve the length of lint of Desi cotton, 15 Mollisons was crossed in 1930 with Million Dollar, a Chinese cotton with medium lint. Successive hybrid generations were critically examined to find out a suitable combination of desirable characters in one plant, and as a result a variety called "Jubilee Cotton" has been evolved which resembles Mollisons in outward appearance, but has a much superior lint. A comparison between the spinning performance of 4-F "Jubilee Cotton" and Mollisons showed that 4-F can spin on the average 21 s. ordinary Mollisons 6 s to 5 s.

and "Jubilee Cotton" from 16's to 18's. Messrs. E. D. Sassoon & Co., Bombay, who spun a bale of this cotton and made it into sheeting cloth expressed themselves highly satisfied with its performance both on the spindle and on the loom.

BURMA.—The total area under improved crop gave an average ginning outturn of 38 Wagale. The total quantity of *Lapas* of the Central Farm ginnery was 111,771 *viss.*, and distribution

As a result of experiments conducted at Mahiana Central P.M. —

we decided to multiply these two strains in separate tracts

Dear Sirs: The Board of Directors of the
y is
is of
port

(2) Rajpura cotton (known by the name of this variety to output of pulsory quality can be recognised).

BARODA STATE.—(1) *Nasrani District.*—An area of about 75,000 acres is now under fairly pure 1027 A.L.F. seed. The Goghaṇi Cotton Control Act came into force in the district from the 25th April 1936.

(2) *Baroda District*—Extension of B 9 cotton in the district in areas where wilt was not much in evidence was in progress and the seed of B 9 cotton supplied in the district amounted to 14,480 lbs sufficient to cover 1,448 acres.

(3) *Mehsana District*.—Attempts are being made to introduce II^{agad} No. 8 in place of local II^{agad} but lack of pure seed in sufficient quantity has hindered effective progress.

(4) *Amruli District*.—*Dhulia* cotton of which a good deal was hoped for on the basis of earlier trials on the farm has not, on the whole, come up to expectations. Its weakness lies in the marked tendency to shed its bolls heavily under certain moisture conditions in late September or early October. Some recovery of this loss is possible in irrigated areas but not when sown, as is most of the cotton, under dry conditions.

Some growers, however, continue to grow it on account of its higher ginning percentage. Trials of other types are being pushed forward. The correct solution is a cotton breeding station for Kathiawar and this, it is expected, will be brought into existence next year at Amreli in the Indian Central Cotton Committee's Dhollera Cotton Improvement Scheme.

Wazirganj Sindh - 115 acres were distributed for the Talau system
a1
b1
su
sufficient for about 1,479 acres

(2) Aurangabad District—Distribution of Banilla seed was continued, with a view to replace the inferior mixture now grown in the district. 115,000 lbs of seed sufficient for about 7,200 acres were distributed by the Agricultural Department on Talau system.

(3) Parbhani District—Distribution of seed of Verum 262 was continued, with the object of replacing the present inferior variety. 40,000 lbs of seed sufficient for about 2,500 acres were distributed by the Agricultural Department on Talau system.

(4) ~~Parbhani District - Distribution of seed of Verum 262 was continued, with the object of replacing the present inferior variety. 40,000 lbs of seed sufficient for about 2,500 acres were distributed by the Agricultural Department on Talau system.~~
a view
of Jaya
of Gada
on Talau system

APPENDIX X.

BALANCE SHEET AS AT 31ST MARCH 1936

BALANCE SHEET AS AT 31st MARCH 1936—could

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BALANCE SHEET AS AT 31ST MARCH 1936—*contd*

RECEIPTS.	Rs. A P	EXPOSURES	Brought forward	Rs. A P	Rs. A P
Brought forward	1,23,67,347 7 6	IV AGRICULTURAL RESEARCH GRANTS—			54,60,931 8 10
		start Physiological Writing up Bollworm Propaganda Bollworm Writing-up Jharwar Witt Writing up Web Circulars of Cotton Research on Cotton Breeding Leaf Disease Survey Y of Cochbar cotton in Bombay Presidency Ration of cotton seed in Bombay Pres decty Puller Propaganda	2,45,139 11 9 5,814 7 8 1,14,509 9 7 91,468 9 2 2,315 1 0 1,82,836 11 2 10,902 10 3 26,573 5 0 1,743 7 6 31,116 6 3 39,983 0 12 3,938 0 6 1,390 0 0 4,713 0 0 3,289 0 0		
V		Jacem Jabres and Phyt. okra Jat Cholam am Cotton Breeding	1,12,361 2 8 88,014 1 1 14,565 10 10 7,016 2 5		
VI		an cal omological te Fly t Rot yer Trials prating and Delimiting ry of D sease of Malnutrition mological	4,73,058 15 4 1,08,943 10 1 46,671 3 2 18,972 2 3 10,812 11 3 6,872 10 0 1,730 10 6 32,867 8 0		
		Carried over	17,64,524 12 7		54,60,931 6 10
Carried over	1,23,67,347 7 6				

BALANCE SHEET AS AT 31ST MARCH 1936—contd

RECEIPTS.	Rs. a. p.	EXpenditure	Rs. a. p.
Brought forward	1,23,87,547 7 8		
VII	Central Provinces —		
(a) Botanical		3,84,607 3 6	
(b) Entomological		8,023 15 0	
VIII	United Provinces —		
(a) Pink and Spotted Bollworm		1,47,534 1 4	
(b) Reddish and Fuscous Bollworm		14,33,943 12 0	
IX	Institute of Farm Industry Industries		
X	Sand	2,21,565 0 5	
XI	Burma —		
(a) Capital Expenditure		2,968 15 5	
(b) Cotton Improvement		37,602 7 9	
XII	Hymenoptera —		
(a) Botanical		2,04,383 7 4	
(b) Cotton Survey		35,871 0 0	
XIII	Pink and Spotted Bollworm		
XIV	Bacter Diseases —		
(a) Root Rot		47,395 3 5	
(b) Comparative Test		4,231 5 3	
(c) Survey of Gossypium cotton		1,500 0 0	
(d) Plant Pather Propaganda		2,342 8 0	
XV	Bengal Comilla		
XVI	Mysore (Deccan Malabar cotton)		
XVII	Leaves receivable (not entered doublef) —		
1	Ilobi Co-operative Cotton Sale Society	7,628 12 8	
2	Gadag	4,455 0 2	
	By current account		
	By Balance		
	Grand Total	12,083 12 10	
		25,11,963 1 9	
	Grand Total	1,23,87,547 7 8	

BALANCE SHEET AS AT 31st MARCH 1936

Provident Fund Account

	Rs. a P	Rs. a P		Rs. a P	Rs. a P
Subscribers contributions % Less—Payments made to sub scribers resigned	1 96 693 8 1		(By advances to subscribers <i>Less—Recoveries made upto 31st March 1936</i>	36 196 2 0	
Committees contributions % Less—Payments made to sub scribers res greed and forfeitures for contributions disallowed	1 92 383 3 6	1 50 740 10 9	Accrued interest on Government Paper upto 31st March 1936 credited to subscribers for distribution	32 617 10 0	3 578 8 0
Suspense Depos t of Mr Dutt for his own contributions Suspense amount due to beon Durbara Singh res greed	1 046 4 10		By Balance	3 424 8 4	
Investment Fluctuations a/c Lapse and Forfeiture b/c		23 0 4	1 069 5 2	3 34 361 4 4	
			38 976 7 5		
			1 871 15 6		
			Total	3 41 384 4 8	
				3 41 384 4 8	

STATEMENT OF RECEIPTS AND PAYMENTS FOR THE YEAR ENDED 31st MARCH 1930.

Receipts	Rs. & P.	Payments	Rs. & P.
Opening Balance Receipts under Section 12 of the Indian Cotton Act, 1923	25,52,070 8	Administration of the Committee [including Improvement of Cotton Market ing, Seed Distribution and Extension Training and Propaganda] and Statistical Research Agreement Research Grants in Aid Technological Research	2,18,622 15 0
*Other Receipts	6,52,675 0	Cleaning Baskets (Government Paper at rate) —	8,04,433 10
Interest on Investments	2,68,072 10	(i) Government of India Loan 1917-50 of the Face Value of Rs 2,75,000 14% Government of India Loan 1926-70 of the Face Value of Rs 9,90,000 14% Government of India Loan 1925-60 of the Face Value of Rs 2,09,000 5% Government of India Loan 1929-44 of the Face Value of Rs 2,10,000 5% Government of India Loan 1930-45 of the Face Value of Rs 3,60,000 6% Bombay Municipal Bonds 1934 of the Face Value of Rs 50,000 6% Karachi Port Trust Coopera De-Bearers 1935 of the Face Value of Rs 50,000 6% Raigao Mus Shah Debentures 1934 of the Face Value of Rs 1,50,000 11% Ind as Sterling Bearer Goods of the Face Value of Rs 20,000	2,28,198 8
Includes Rs 3,18,2-0 on account of Shaking Fund and Rs 14,926-2 against Loss Recoverable from India Fadak Cooperative Cotton Sale Society Ltd	4,12,039 8	(Market Value on 31st March 1930 Imperial Bank of India Current Account Interpret - Committee Accounts, ascertained by the Secretary Technological Laboratory as certified by the Director, High Commissioner for India, London, for Scholar ships (1930) Director of Agriculture Bombay Presidency certified by the Director of Agriculture Bombay Presid Plant Pathologist, Punjab, Certified by the Plant Pathologist Punjab Publicity Department Unauthorised pay of a man who has resigned	24,72,196 2 54,991 13
*Includes Rs 1,186-14-0 against proceed sion for Shaking Fund for the year 1935-36 and Rs 1,69,767 13-7 on account of Net Profit realised on Sale of Securities	4,11,116 11 2	Compensate (Recoverable) Loss Recoverable (not covered above)	
Total	30,64,769 11 2	#Total Closing Balance	25,72,131 9 1
4% Government of India Loan 1906-70 of the Face Value of Rs 1,16,900 has been deposited with the Imperial Bank of India for security against any overdrawn that may be required by the Cotton Fund.			36,64,760 11 2
This includes Rs. 7,019 as cost of providing for Shaking Fund			

We have seen and the above Statement of Receipts and Payments of the Indian Central Cotton Committee with the Books Vouchers and Certified Returns of the Committee, have also held all the information and explanations we have required and certify that to the best of our information and explanations received, the above Statement is correct abstract of the figures appearing in the Books and is drawn up in conformity with the Rules under the India Cotton Act 1923
 (Sd) S. B. Bhikunlal, Auditor
 Registered Accountant, Audited by
 H. R. Patel, M.A., F.R.C.A., F.R.I.C.A.

PROVIDENT FUND ACCOUNT AS AT 31ST MARCH 1936

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	Rs. a p	Rs. a p	Rs. a p	Rs. a p	Rs. a p
To Open Balance as on 1st April 1935	Rs. a p				
Less — (i) Interest made due on the year for a subscriber who died in 1934	224 7 6	2 68 25 3 1			
Subscribers contributions	78 35 0 0	53 27 4 14 0			
(ii) Recoveries against Advances	4 92 0 14 0	2 97 54 0 1 1			
Less — Refund to subscribers who have received Advances	5 72 2 14 6	10 00 7 15 6			
Advances to subscribers	4 25 4 15 0				
Committee's contribution received from India Central Cotton Committee at 100 per cent.	28,554 0 0				
Less — Payments to subscribers who have resigned including transfers to Lapses and Portfolios	5 15 88 3 7				
Accrued or contributions of subscribers	5 65 3 3 6				
Interest received on Investments	10 43 1 15 4	3 10 23 1 0 1			
Interest received on Advances to subscribers	158 12 4				
Refund of Income Tax deducted on interest received during 1934-35	102 5 0				
Less — Interest paid during the year to subscribers who have resigned	10 69 2 14 8				
On their own contributions	Rs. a p				
On Committee's contributions	50 7 7				
Interest paid in advance at the time of purchase of Government Paper (unrecovered)	52 7 11				
Income-Tax deducted from interest on investments (recoverable)	74 4 0 5				
Bank's commission for collection of interest and cost of stamps	230 10 5				
Cost of stationery etc.	28 15 0				
	15 15 0				
Lapse and Portfolios Account		1 12 0 5 4			
Investment of Puntuation Account		8 57 7 6 4			
Surplus Account (From Durbar Singh & due for Provident Fund)		1 29 2 10 7			
Total		13 25 7 5 1			
		23 0 4			
		Total			
		3 34 38 1 4 4			

*Includes Rs 1 048 4 10 being Suspense Deposit with interest thereon of Mr. Dutt & own contribution

By Balance —
 (i) Securities in Government Paper at Market Price
 31% Government of India Bonds
 Notes of the face value of Rs. 1 60 000 0 0 1 56 374 11 0
 3% Governmental of India Loan 1947 of the face value of Rs. 55 500 0 0 58 656 9 0
 5% Governmental of India Loan 1939-44 of the face value of Rs. 25 600 0 0 27 760 0 0
 4% Government of India Loan 1960-70 of the face value of Rs. 32 600 0 0 36 593 8 0
 6% Bombay Improvement Trust Bonds 1937 of the face value of Rs. 17 500 0 0 18 243 12 0
 Savings Bank Account with the Imperial Bank of India & Current Account with the Imperial Bank of India a

*Total Closing Balance

Examined and found correct
 (Sd) S. B. BRIMONIA & CO,
 Registered Accountants, Authors

BOMBAY 16th June 1936

STATEMENT SHOWING EXPENDITURE UNDER RESEARCH AND SEED EXTENSION SCHEMES UPTO 31ST MARCH 1936

STATISTICS SHOWING EXPENDITURE UNDER RESEARCH AND SEED EXTENSION SCHEMES UPTO 31ST MARCH 1930—CONT'D

Major Heads	Total sanctioned grant	Period	Date of starting of the scheme	Expenditure from Capital Grants etc.			Expenditure from additional grants on staff field experiments, labour stores, laboratory and field equipment of a permanent or semi-permanent nature	Net working expenses, staff field experiments, labour stores, laboratory and field equipment of a permanent or semi-permanent nature	REMARKS
				(a)	(b)	7			
Subsequent Research Grants— (not used)				Land and Buildings	Machinery apparatus and other property	8	9	10	
RESEARCH SCHOLARSHIPS—contd.									
I	Bimonthly Visitation—(contd.)— (a) Cotton Breeding (b) Cotton Research (c) Survey of Small Leaf Diseases (d) Effect of cotton on Great Cotton In (e) Survey of Great cotton in (f) Duration of cotton seed— Recurrents Non recurring	Rs. a p. 1rs Mths	1st April 1932 Not to start 6th Nov 1933 16th Jan. 1935 1st Feb 1936	31 116 6 3 1 749 7 6 3 938 9 6 1 380 0 0 4 715 0 0	Rs. a p. 31 116 6 3 495 2 6 3 445 7 3 700 0 0	Rs. a p. 31 116 6 3 495 2 6 3 445 7 3 700 0 0	Rs. a p. 31 116 6 3 495 2 6 3 445 7 3 700 0 0	Rs. a p. 31 116 6 3 495 2 6 3 445 7 3 700 0 0	Rs. a p. 31 116 6 3 495 2 6 3 445 7 3 700 0 0
V	Aligarh School— (a) Herbarium and Ethnological (b) Palaeontology and Ethnological	1 47 668 0 0 2 12 779 0 0	16 9 7 0	1 12 361 2 8 66 014 1 1	4 420 10 3 6 891 3 10	*1 07 940 8 5 29 122 11 3	Da. do		*Previous audited figures
VI	Poona Chhatra S.— (a) Capital (b) Recurring (c) Nelsin Cotton Breeding	900 0 0 21 010 0 0 15 730 0 0	5 6 0	14th Jan. 1931 14th June 1931	14 565 10 10 7 013 2 5	881 11 7 404 0 0	331 11 6 13 352 3 9		
VII	Punjab S. Long— (a) Botanical— (b) Capital Expenditure (c) Working Expenses	51 530 0 0 1 635 650 0 0	14 71	15th August 1935	4 73 058 15 4	22 158 0 0 9 102 11 0	34 516 1 4	4 07 282 3	† Rs. 2 030 transferred to Capital from working grant.
VIII	Farmenches— (a) Capital Expenditure (b) Working Expenses (i) Black and Spotted Bull— worms)	6 000 0 0 2 40 410 0 0	10 11	4th May 1936	1 89,843 10 1	5 828 3 10	9 695 15 8	1 73 321 8 7	0
IX	White Fly	58 067 0 0	3 5	1st May 1931	46 671 3 2				0
X							37,335 2 2		0

STATEMENT SHOWING EXPENDITURE UNDER RESEARCH AND REED EXTENSION SCHEMES UPTO 31st MARCH 1936—contd

Major Head	Total sanctioned grant	Period.	Date of start ing of the scheme	Total expenditure upto 31st March 1936	Expenditure from Capital Grants on Research			Expenditure from General Grants on Research			Net working expenses i.e., staff, field experiments, labour stores, laboratory equipment or permanent or semi-permanent nature	Remainder
					(a) Land and Buildings	(b) Machinery and apparatus and other provable property	(c) Permanent or semi-permanent nature	Rs. a p	Rs. a p	Rs. a p		
1	2	3	4	5	6	7	8	9	10	11	12	13
VII. Purchases—(contd.)												
(i) Raw R. A.	42,598	0	0	0	1st Sept. 1932	18,972	2 3			181	4 9	18,790 13 6
(ii) Synthetic Trials	14,470	0	0	0	6th July 1933	10,812	11 3			3,025	15 3	7,759 14 0
(iii) Industrial	1,89,420	0	0	3 0	15th March 1935	32,867	8 0			3,559	2 0	29,303 6 0
(iv) Industrial and Technical plants												
(v) Purchase	1,900	0	0	2 0		6,871	10 0					
(vi) Importing	6,700	0	0	0								
(vii) Survey of terrain of Malabar-Kerala	2,676	0	0	0 10	1st June 1934	1,730	10 6					
VIII. General Expenditure—												
(i) Administrative	441,000	0	2 6	Oct. 1923				4,533	7 10	3,79,753	11 8	
	5,36,150	0	13 0	1st April 1926	3,84,607	3 6						
(ii) Normal & Special	1,173	0	1 0	2nd July 1934								
	15,633	0	1 3		0 023	15 0						
VIII. Capital Expenditure—												
(i) Capital Expenditure—	34,50	0	0					49,511	5 6	3,065	4 3	55,257 7 7
(ii) Working Capital	50,00	0	0									
(iii) Electricity	44,675	0	7 9	1st July 1923 (i) 1st Oct. 1926	1,47,834	1 4						
(iv) Purchase of land, buildings, furniture etc. for research purposes	10,80	0	3 8	1st July 1933	14,611	4 1						
X. Industrial and Technical Expenditure—												
(i) Capital Expenditure	1,07,28,575	12 10		Oct. 1924	14,33,943	12 0		2,12,532	11 5	70,933	1 5	(i) Rs. 50,20,42 10 transferred from Recurring grant to Capital.
(ii) Working Capital	11,40,417	15 7								31,837	4 4	11,18,550 10 10
X. Total	2,74,346	0	8 9	10th July 1927	2,21,565	0 5				19,693	2 0	2,02,471 14 5

STATEMENT SHOWING EXPENDITURE UNDER RESEARCH AND SEED EXTENSION SCHEMES UPTO 31ST MARCH 1936—*contd*

Major Head	Total allocated Grant	Period.	Date of start ing of the scheme	Total expendi- ture upto 31st March 1936	Expenditure from Capita- l Grants on			Expenditure from: annual grants on staff, field exper- iments, labour and field equip- ment, laboratory and field equip- ment or semi permanent nature	Net working expenses, i.e. expenses includ- ing petty ap- paratus	REMARKS
					(a)	(b)	(c)			
1	2	3	4	5	6	7	8	9	10	11
XI Research										
(1) Capital Expenditure	3,000	0		2,905	15	5	2,905	15	5	
(2) Cotton Improvement	49,032	0	0	37,602	7	9	4,097	8	0	
XII Hygiene—										
(1) Industrial	5,59,617	0	0	911	10th May	2,04,383	7	4	33,804	15
(2) Cotton Survey	29,165	0	0	5 0	28th June	33,871	0	4	17,461	15
(3) Fink and Spotted Bollworm	52,025	0	0	5 4	1st June				1,66,921	7
	*43,580	0	0	*2 0	1935	31,187	7	0	23,11	5
									33,807	4
									11	Scheme closed down on 27th June 1936
VIII Research—Bengal Cotton 1m										
(1) Capital Expenditure	14,500	0	{	10 0	1st Jan 1931	8,554	0	0	3,735	1
(2) Working Expenses	65,320	0	{							
XIV Research										
(1) Root Rot—	4,000	0	{		1st Feb 1932	4,000	0	0	242	8
(2) Comparative tests of 1077 and 1A cottons	*37,390	0	{	*5 4						
	4,250	0	{	1 2	15th April 1932	4,251	5	3	3,859	3
XV Survey of Cockchafer Cotton										
(1) Plant Pather Propaganda	5,000	0	{	5 0	1st Feb 1935	1,500	0	0	145	11
(2) Bengal Comilla Cotton	9,280	0	{	2 0	1st Jan 1936	2,347	8	0	6	4,195
XVI Myrore (Doddahath) Cotton	15,540	0	{	5 0	1st Dec 1936	5 147	2	0	1	1,500
XVII Collection of Herbarium specimens in Iran.	8,442	0	{	3 0	1st Nov 1935	985	0	0	402	15
	4,000	0	{		31st Aug 1936	4,744	2	0	988	0

100

Subject to the Govern-
ment of India's
sanction and accep-
tance of certain
conditions by the
Hyderabad State

down
on 27th June 1936

STATEMENT SHOWING EXPENDITURE UNDER RESEARCH AND SEED EXTENSION SCHEMES UPTO 31st MARCH 1949—contd

Major Heads	Total sanctioned grant	Period	Date of start ing of work	Total expenditure upto 31st March 1938	Expenditure from Capita l Grants on			Net worth of expenses of annual grants on staff field experiments apparatus and stores laboratory and field contingencies included in petty ap- p ratus	Revised scheme sanctioned for one year only for the present from 1st June 1938 to which Haji Gajid Ali bin Haveri and Balloon schemes have been merged and expenditure being met from the savings of those schemes and the Bombay Government contribution Rs. 8,000.
					(a)	(b)	(c)		
					Lands and Building	Mach entry appr ariatus and other immoveable property			
SEED SCHEMES									
(a) <i>Uttar</i> (b) <i>Gadak</i>	50,110 0 0 54,345 0 0	6 years 6	June 1930 June 1930	42,524 13 10 41,045 2 7	Re a. P. 5 14 0	42,518 15 10 41,045 2 7			
(44) <i>Gadak Supplementary</i>	21,448 0 0	4	10th June 1931	29,167 11 4		2,79 5 6	17,258 5 10	Scheme closed down on 10th June 1935 Not started	
(e) <i>Uttar</i> (b) <i>Athani</i>	22,732 0 0 18,737 0 0	2 (a)	5th April 1932	19,925 15 6		1,722 11 6	17,203 0 2	(a) Scheme closed on 31st May 1936 Not started	
(c) <i>Plumbers</i> (d) <i>Seeds</i>	27,425 0 0 86,050 0 0	2 a	1st April 1939	48,431 10 4			46,131 10 4		
(e) <i>Khandesh</i>	2,30,349 0 0 22,787 0 0	5 { 1 year	1st May 1931	1,59,727 9 0		11,357 5 2	1,48,443 3 10	Rece pts amount due to Rs 1,10,000 are anticipated in 1st scheme. The sum of Rs 20,767 for the extended period is after taking into account anticipated receipts of Rs 8,000	
(a) <i>Dresser Costs</i>	23,792 0 0	6 years	1st April 1934	3,721 12 7			3,716 6 7	772m scheme is self supporting due to anticipated receipts	
(b) <i>R D S</i>	10,493 0 0	2	1st Dec 1935	1,065 0 0			25 3 0	1,041 13 0	
(c) <i>Revised Journals and Literature</i>			1st Jan 1936 1st June 1936						

STATEMENT SHOWING EXPENDITURE UNDER RESEARCH AND SEED EXTENSION SCHEMES UPTO 31ST MARCH 1936—concl

Major Head	Total amounted grant.	Period.	Date of start ing of work	4 SEED SCHEDULE	Expenditure from Capital Grants etc.			Expenditure from annual grants on experiments and equiment of a permanent or semi-permanent nature			Net working expenses / annual grants on staff field experi- ments labour stores laboratory and field contri- gencies includ- ing petty ap- paratus			Remarks.
					2 Rs. & P	3 Rs. & P	5 Rs. & P	6 Rs. & P	7 Rs. & P	8 Rs. & P	9 Rs. & P	10		
2. Agriculture (i) Fertilizers and Alleviations of Distress Minister Tripper	21,050 8 0	6 years.	16th May 1931	19,840 3 9	148 8 0	148 8 0	18,491 11 8	18,491 11 8	148 8 0	148 8 0	18,491 11 8	18,491 11 8	18,491 11 8	Provisionally extended up to 14th September 1937
(ii) CA 2 (iii) II 1	8,310 0 0 15,980 0 0	5 2 ** (4)	15th Sept. 1932 6th May 1933	23,762 3 2 3,952 2 0	83 13 0	83 13 0	23,678 6 2	23,678 6 2	83 13 0	83 13 0	23,678 6 2	23,678 6 2	23,678 6 2	(a) Scheme closed down on 16th July 1934
Paras-Lylipter Ginnery Sect. 1 try mach	18,115 0 0 5,910 0 0 35,456 0 0	6 years. 8 years. 8 months	1st April 1931 1st March 1930	18,038 3 3 1,90,696 0 11 30,096 12 1	6,921 3 0	6,916 14 3	5,780 3 9	5,780 3 9	6,921 3 0	6,916 14 3	18,885 13 2	18,885 13 2	18,885 13 2	Extension from 1st September 1930 to 28th February 1941 subject to the compliance of the Committee's condi- tions by the Hyder- abad Government
General Provinces (i) Verona cotton	117,900 8 0	3 years & 8 months.	1st Sept. 1930	73,544 2 5	73,544 2 5	73,544 2 5	71,896 9 5	71,896 9 5	73,544 2 5	73,544 2 5	71,896 9 5	71,896 9 5	71,896 9 5	Scheme closed down on 30th April 1934
(ii) Extraction of Long Staple cotton and Marketing of Verma cotton. Panach United Provinces C/072	1,25,525 0 0 23,690 0 0 45,800 0 0	3 years 5 5	1st April 1934 18th April 1934 1st May 1935	5,755 12 5 5,680 0 0	*217 8 0 300 0 0	*217 8 0 300 0 0	71,896 9 5 6,680 0 0	71,896 9 5 6,680 0 0	*217 8 0 300 0 0	*217 8 0 300 0 0	71,896 9 5 6,680 0 0	71,896 9 5 6,680 0 0	71,896 9 5 6,680 0 0	* Provisional figures.

APPENDIX XI.

INDIAN RAW COTTON CONSUMED IN INDIAN MILLS

(Based on Returns made under the Indian Cotton Crop Act, 1923 by Mills in British India and on Voluntary Returns from Mills in Indian States)

Cotton Year 1st September to 31st August

(In Bales of 400 lbs. Nett.)

	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34	1934-35	1935-36
Peninsular India	762,810	697,255	731,937	727,668	435,426	342,056	766,375	664,546	611,606	565,084	491,709	697,257	664,199
Allardia	262,745	273,639	296,800	264,139	298,075	318,963	344,021	521,503	372,257	348,039	373,343	326,558	220,962
Panel & Presidency	1,180,410	1,424,447	1,189,559	1,167,692	694,671	1,044,925	1,300,859	1,173,659	1,182,646	1,118,297	1,068,549	1,250,616	1,159,610
Madras Presidency	149,721	162,676	176,274	185,207	194,591	204,284	211,483	214,750	260,707	292,013	278,060	812,164	365,423
United Provinces	170,522	177,064	161,740	204,702	1,0,846	162,462	234,735	225,623	256,870	273,573	277,230	252,424	617,011
Central Provinces and Bihar	64,635	106,052	109,095	111,202	116,858	121,391	123,146	118,492	115,018	111,700	112,680	128,014	130,208
Portuguese	72,539	83,553	77,646	89,63	62,066	94,212	99,0,5	91,993	102,360	103,784	107,633	101,101	86,892
The Punjab and Sind	23,568	30,663	35,394	40,687	45,638	54,573	64,464	73,736	89,681	80,854	71,939	83,897	89,450
Rest of Brit. & India	12,277	14,414	17,519	15,196	15,040	22,119	24,458	27,161	30,342	31,935	35,199	38,575	38,010
Total—British India	1,093,438	1,099,069	1,106,204	1,012,733	1,019,769	1,714,058	2,057,693	1,935,363	1,667,603	2,009,664	1,946,210	2,183,791	2,226,374
Total—Ind. States*	142,805	179,608	187,614	279,445	251,589	277,540	315,599	333,986	358,793	351,760	350,116	426,341	449,196
Total—India	1,835,643	2,174,679	1,685,816	2,042,176	1,771,549	1,991,578	2,573,094	2,269,349	* 346,396	2,360,924	2,356,326	2,612,132	2,677,572

* Figures for Indian States upto and including 1930-31 being based on para production returns, include foreign cotton also.

INDIAN RAW COTTON CONSUMED IN MILLS IN INDIAN STATES

(Based on Voluntary Returns from or Yarn Production figures of Mills in Indian States)

Cotton Year 1st September to 31st August

(In Bales of 400 lbs Netts)

	1925-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34	1934-35	1935-36
Madras	15,210	16,697	19,067	19,323	23,074	31,290	33,455	33,231	45,568	51,771
Myers	43,571	44,220	39,619	46,360	43,376	49,793	50,546	47,168	51,108	40,708
Bengal	48,079	46,694	46,512	59,043	67,579	58,534	50,587	53,612	57,146	51,963
Gauhati	24,357	25,718	34,768	41,463	45,707	45,892	43,306	49,472	56,318	72,163
Indore	53,576	61,391	76,070	83,026	88,820	95,296	91,036	111,430	114,779	113,779
Kathawar Station					20,283	18,849	18,868	26,506	3,438	37,397
Other Indian States Providence	44,609	52,581	57,224	61,454	{ 32,558 18,350	39,382 20,257	40,759 23,170	45,197 23,810	45,235 22,691	51,482 22,355
Total Indian States	229,445	231,589	277,540	315,509	335,908	358,793	351,260	390,117	476,341	446,198

LOOSE (UNPRESSD) INDIAN RAW COTTON RECEIVED IN SPINNING MILLS IN BRITISH INDIA

(Based on Voluntary Returns furnished by Mills)

Cotton Year 1st September to 31st August

(In Bales of 400 lbs Netts)

	1925-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34	1934-35	1935-36
Bombay Presidency	25,578	24,970	27,274	24,361	54,409	74,979	60,092	74,808	58,355	75,617
Madras Presidency	35,196	39,560	52,168	46,582	45,717	59,369	68,340	110,675	123,960	147,044
United Provinces	16,891	10,308	19,574	20,441	16,496	14,367	19,756	17,871	10,090	10,405
Central Provinces and Berar	40,762	20,681	6,974	18,243	15,771	20,743	17,462	18,382	20,544	27,502
The Punjab	3,910	4,739	3,760	4,361	4,307	2,317	2,149		4,535	3,110
Total	125,169	100,435	104,074	111,908	148,700	211,795	215,279	221,996	217,784	263,678

APPENDIX XII

**STOCKS OF INDIAN RAW COTTON HELD IN INDIA BY THE MILLS
AND THE TRADE ON 31st AUGUST, 1935 AND 1936**
 (In thousand bales* of 400 lbs each)

Trade Descriptions of Cotton	TRADE STOCKS ON 31st AUGUST								M.I.S. STOCKS on 31st August	Total Indian Trade and Mill Stocks on 31st Aug		
	BOMBAY ISLAND		KARACHI		REST OF INDIA		TOTAL INDIA					
	1935	1936	1935	1936	1935	1936	1935	1936				
BANGALORE—												
United Provinces	—	—	—	—	(a) 8	(a) 4	9	4	23	16		
Punjab	—	—	27	18	(b) 4	(b) 5	31	24	6	12		
Sind	—	—	14	8	(c) 1	(c) 2	14	8	3	3		
Rajputana	—	—	1	2	(d) 1	—	2	2	15	17		
Others (Unclassified)	65	19	—	—	(e) 1	—	68	19	3	1		
Total	85	19	42	27	15	11	122	57	52	47		
1935	1936	1935	1936	1935	1936	1935	1936	1935	1936	1935	1936	
OMRAS—												
Central Provinces Omras	19	10	—	—	(d) 15	(d) 16	24	16	32	17	—	
Berar Omras	24	6	—	—	(d) 14	(d) 12	38	18	11	9	49	
Khandesh-Bailla	—	—	—	—	(f) 4	(f) 2	23	12	13	7	13	
Khandesh Omras	19	10	—	—	(g) 4	(g) 2	—	—	15	6	36	
Central Ind.—Malvi	—	—	—	—	(h) 4	(h) 11	18	26	18	34	16	
Central Ind.—Others	14	15	—	—	(i) 4	(i) 27	18	33	10	10	28	
Barailand Nagar Omras	14	6	—	—	(j) 4	(j) 27	—	—	5	5	29	
Total	90	47	—	—	31	58	121	105	110	88	231	
VISWANATHA HYDERABAD GAONI	—	—	—	—	(k) 10	(l) 4	10	4	52	50	62	
Total	—	—	—	—	10	4	10	4	58	8*	68	
AMERICAS—												
Punjab—239 F (and New * Types)	—	28	—	—	(m) 1	—	29	8	16	6	45	
Punjab (Unspecified—4 F)	13	7	39	64	(n) 23	(n) 16	78	81	44	89	119	
Sind—28 F and F 1	—	24	7	16	—	—	7	42	10	15	17	
Sind (Unspec Bed—4 F)	17	2	4	28	—	(o) 1	21	61	19	18	40	
Dharwar (Gadag 1)	—	—	—	—	—	—	—	—	6	4	6	
Dharwar (Upland—Un Spec Bed)	—	—	—	—	—	—	—	—	1	7	1	
Cambodia (Colombaire No 2)	—	—	—	—	—	—	—	—	61	62	61	
Cambodia (Unspecified)	6	6	—	—	—	—	6	8	35	34	44	
Total	39	67	60	116	23	12	112	169	182	245	294	
BEGANJ—												
Surat Navsari (Surti)	8	61	—	—	(p) 6	—	8	61	26	42	34	
Begunj (Unspec Bed)	2*	118	—	—	—	—	28	118	30	45	88	
Total	60	179	—	—	6	—	36	179	56	85	62	
DHOOLKAAS—												
Mattan	16	2	—	—	—	—	16	2	3	4	23	
Cutch	—	—	—	—	—	—	—	—	2	2	—	
Wagad	—	—	—	—	(q) 7	(q) 6	34	149	32	73	32	
Dholkaas (Unspecified)	27	145	—	—	—	—	—	—	8	44	155	
Total	45	145	—	—	7	6	5*	151	49	35	101	
SOUTHERNS—												
Kumptia (Jayawant)	—	—	—	—	—	—	—	—	20	29	29	
Kumptia (Unspecified)	—	+1	—	—	—	—	—	—	81	49	51	
Westerns (Jowari and Nungari)	22	15	—	—	(r) 3	(r) 3	84	106	4*	4*	179	
Northerns	—	—	—	—	(s) 114	110	14	20	5	6	18	
Cocomadas (& Warangal)	—	—	—	—	—	—	—	—	19	20	16	
Karunangal	—	—	—	—	—	—	—	—	24	42	30	
Tlonevelis	6	1	—	—	—	—	6	1	24	42	30	
Salems	—	—	—	—	—	—	—	—	2	2	—	
Unclass bed	14	—	—	—	—	—	14	—	—	—	1	
Total	42	24	—	—	26	25	89	149	192	72	373	
CORN LMAS												
BUSMAS (Vegals & Waxy)	1	—	—	—	—	—	1	—	1	2	—	
Other Sorts (Unclass bed)	10	4	—	—	—	—	10	4	—	10	4	
Total Indian Cotton	32	535	92	197	112	165	93*	838	72*	792	1444	

*Standardised as bales of approximate average gross weight 470 lbs. and net wt. 413 lbs. The of cleaned cotton 470 lbs.

N.B.—Detailed Statement of Mill Stocks on the 31st August 1936 is attached.

(a) At Calcutta and Central Provinces.

(b) In the Punjab.

(c) At Ahmedabad.

(d) In the Central Provinces.

(e) In Bihar.

(f) In East and West Bengal Districts.

(g) In Madras Presidency.

(h) Includes 657 bales held at Ahmedabad.

(i) Includes 600 bales held at Ahmedabad.

(j) Includes 6,000 bales held in Hyderabad & S. Andhra.

STOCKS OF RAW COTTON HELD BY THE
 (Compiled from Voluntary
 (In thousand bales*)

Trade Descriptions of Cotton	Bombay Island	Ahmed abad	Rest of Bombay Presidency	Total Bombay Presidency	Nadras North	Nadras South	Total Madras Presidency	United Provinces	Central Provinces	Bengal	Total C.P. and Berar
BENGALS—											
United Provinces	1	2									
Punjab					2						
Sind	3				3						
Reputana					1						
Others	1										
Total	7	1		8	—	—	—	9	1		3
ORISSA—											
Central Provinces Orissa	1										
Berar Orissa	2				2						
Khasiash—Bassila	1			5	6						
Khandesh Orissa	1			3	6						
Central India—Malvi	2	2			4						
Central India—Others	3			2	7						
Bardia and Nagar Orissa	1			4	5						
Total	13	2	16	31	—	—	—	1	20	3	1
VRINDAVAN 262	1										
HYDERABAD GAOBANI	3	—	22	27	2	—	—	5	—	3	11
Total	6	—	22	22	3	—	3	—	18	4	22
AMERICANS—											
Punjab—(239 F and New Types)	9	—	1		10	2	1	3			
Punjab (Unspecified—4 F)	18	—	3		19	2	16	24	1		
Sind—239 F & F 1	10				13	8	2	—			
Sind (Unspecif. Sadi—4 F)	6				4	—	—				
Dharwar (Gadag 1)	4				6	—	—				
Dharwar (Uplands—Un- specified)	4				1	—	55	22	—	1	
Cambodia (Colombatore No 2)	—				1	—	21	22	—	1	
Cambodia (Unspecified)	10				11	—	—	—	—	1	2
Total	62	6	3	71	6	101	107	24	1	2	18
BROACH—											
Surat Navsari (Surli)	14	18	3	33	—	—	—	—	—	1	1
Brocach (Unspecified)	22	13	1	33	—	1	1	—	—	1	1
Total	36	33	4	73	—	1	1	—	—	1	2
DAULATABAD—											
Matthao	3	—			8						
Catch	—				22						
Waged	1	21			8						
Dholiaras (Unspecified)	4	2			—						
Total	8	23	—	31	—	—	—	—	—	—	—
SOUTHERNS—											
Kamptes (Jayawant)	17	1	3	23	8	1	6	—	—	—	
Kamptes (Unspecified)	17	—	10	27	3	—	8	—	—	—	
Westerns (Jowari and Mangari)	12	1	13	28	8	1	10	—	—	—	
Northerns	1	—	2	2	1	18	1	19	—	—	
Cocoanadas (& Warangal)	—	—	2	2	—	1	18	18	—	—	
Karunganal	—	—	—	—	—	18	18	—	—	—	
Tiruvellies	—	—	—	—	—	39	39	—	—	—	
Salema	—	—	—	—	—	2	2	—	—	—	
Total	45	2	33	80	39	81	100	—	—	—	3
COMILLAS											
Burwan (Wagale & Wagyl)	—	—	—	—	—	—	—	—	—	—	1
Others Sorts	—	—	—	—	—	—	—	—	—	—	—
Total Indian Cotton	150	87	75	372	48	183	211	34	40	8	25
Americans	10	—	1	10	—	—	—	—	—	—	—
Egyptians	4	7	1	12	1	1	2	—	—	—	2
East Africans	18	12	4	33	—	2	2	—	—	—	—
Orissa (Indian Mekoppota etc etc) .	4	1	1	8	—	—	—	—	—	—	—
Total Foreign Cotton	37	20	8	63	1	3	6	—	1	—	3
GRAND TOTAL	217	87	81	345	49	186	215	34	41	8	80

* Standard Indian bales of approximate average gross weight 400 lbs.

MILLS IN INDIA ON 31st AUGUST, 1936.

Returns furnished by Mills
of 400 lbs. each)

Peninsular and Delhi	Retro British India	Total British India	Hyder abadi	Mysore	Baroda	Gwalior	Indore	Kathawar States	Other Indian States	Food- canning	Total India States	Grand Total	Trade Descriptions o Cotton			
													BANGALS— United Provinces Punjab Sind Rajputana Others	DOMRAS— Central Provinces Domras Berar Omras Khanda-Benalis Khanda-Omras Central India—Nalvi Central India—Others Baril and Nagar Omras		
4	1	15	—	—	—	—	—	—	—	—	—	1	16			
3	1	22	—	—	—	—	—	—	—	—	—	2	12			
	10	14	—	—	—	—	—	—	—	—	—	1	15			
	1	1	—	—	—	—	—	—	—	—	—	1	1			
7	16	43	—	2	—	—	—	—	—	—	—	4	47	Total		
	—	17	—	—	—	—	—	—	—	—	—	—	17			
	9	2	—	—	—	—	—	—	—	—	—	—	8			
	6	4	—	—	—	—	—	—	—	—	—	—	2			
	4	8	—	—	—	—	—	—	—	—	—	—	6			
	8	5	—	—	—	—	—	—	—	—	—	—	34			
	—	—	—	—	—	—	—	—	—	—	—	2	10			
	—	56	1	—	—	—	—	—	—	—	—	—	5			
	—	—	—	—	—	—	—	—	—	—	—	—	86	Total		
	—	12	—	—	—	—	—	—	—	—	—	—	9	12		
	—	41	9	—	—	—	—	—	—	—	—	—	50	VERUM 262		
	—	—	53	9	—	—	—	—	—	—	—	—	9	HYDERABAD GAJRAH		
	—	—	—	—	—	—	—	—	—	—	—	—	62	Total		
12	—	16	—	—	—	—	—	—	—	—	—	—	16			
	83	15	—	—	—	—	—	—	—	—	—	—	89			
	17	4	—	—	—	—	—	—	—	—	—	—	15			
	6	6	—	—	—	—	—	—	—	—	—	—	4			
	60	34	—	—	—	—	—	—	—	—	—	—	2			
13	3	235	—	5	—	—	—	—	—	—	—	2	10	245	Total	
	—	37	—	—	—	—	—	—	—	—	—	—	5	42		
	40	—	—	—	—	—	—	—	—	—	—	—	3	43		
	—	77	—	—	—	—	—	—	—	—	—	—	8	85	Total	
	—	—	5	—	—	—	—	—	—	—	—	—	1	4		
	—	22	—	—	—	—	—	—	—	—	—	—	6	28		
	—	6	—	—	—	—	—	—	—	—	—	—	6	6		
	—	—	31	—	—	—	—	—	—	—	—	—	7	59	Total	
	—	—	29	—	—	—	—	—	—	—	—	—	17	29		
	—	32	—	—	—	—	—	—	—	—	—	—	17	39		
	—	37	3	13	—	—	—	—	—	—	—	—	2	52		
	—	20	—	—	—	—	—	—	—	—	—	—	2	27		
	—	19	4	—	—	—	—	—	—	—	—	—	2	6		
	—	49	2	—	—	—	—	—	—	—	—	—	1	16		
	—	—	183	2	35	—	—	—	—	—	—	—	41	224	Total	
	—	2	3	—	—	—	—	—	—	—	—	—	2	3		
	—	—	—	—	2	—	—	—	—	—	—	—	2	2		
19	21	691	12	42	4	33	20	8	9	7	118	294	Total India Cotton			
	—	—	10	—	—	—	—	—	—	—	—	—	10			
	—	15	—	—	3	—	—	—	—	—	—	—	4	18		
	—	40	—	—	—	3	—	—	—	—	—	—	4	44		
	—	6	—	—	—	—	—	—	—	—	—	—	6	6		
	—	—	21	—	—	3	4	—	—	—	—	—	7	79	Total Foreign Cotton	
19	21	752	12	42	4	33	20	8	9	7	121	293	Total Total			

and net weight 591 lbs. of cleaned (fat) cotton.

STOCKS ON 31ST JANUARY, 1935 AND 1936 OF "TINNEVELLIES," "SALEMS"
AND "CAMBODIAS" HELD BY THE MILLS AND THE TRADE
IN THE MADRAS PRESIDENCY.

(In thousand bales of 400 lbs. net)

Trade Descriptions of Cotton	Mill stocks on 31st January		Trade stocks on 31st January.		Total stocks on 31st January.	
	1935	1936	1935.	1936	1935	1936.
Tinnevellies	21	14	7	12	28	26
Salems	10	6	2	3	12	9
Cambodias	42	41	11	22	63	63
Total	73	61	20	37	93	98

APPENDIX XIII.

EXPORTS BY SEA OF INDIAN RAW COTTON CLASSIFIED BY VARIETIES.

(Compiled from Voluntary Returns furnished by Exporters)
 1st September 1935 to 31st August 1936
 (In thousand bales* of 400 lbs each)

Trade Descriptions of Cotton	Exported to				Total Exports
	Europe (excluding United Kingdom) and the West	United Kingdom	Japan	China and the East (excluding Japan)	
BENGALS—					
United Provinces	20	8	28	2	58
Punjab	210	73	223	16	522
Sind	130	40	37	1	208
Rajputana	9	7	8	—	21
Others	3	4	27	—	34
Total	372	132	323	19	846
OOMRAS—					
Central Provinces—Oomras	48	36	85	1	170
Berar—Oomras	37	13	204	4	258
Khandesh—Banilla	1	—	15	—	16
Khandesh—Oomras	33	—	175	10	218
Central India—Malvi	4	—	14	—	18
Central India—Others	20	1	122	28	171
Barsi and Nagar—Oomras	10	1	53	14	78
Unclassified	24	5	106	—	135
Total	177	56	774	57	1,064
VERUM 262	—	—	—	—	—
HYDERABAD GAORANI	1	—	6	—	7
Total	1	—	6	—	7
AMERICANS—					
Punjab—289 F	3	1	1	—	5
Punjab (Unspecified—4 F)	164	159	359	17	699
Sind Sudhar—(289 F & F 1)	2	3	—	2	7
Sind (Unspecified—4 F)	9	20	20	—	59
Dharwar (Gadag 1)	1	—	1	—	2
Dharwar (Upland—Unspecified)	2	—	10	—	10
Cambodia (Coimbatora No 2)	7	5	11	—	21
Cambodia (Unspecified)	—	—	—	—	23
Total	188	188	430	20	826
BROACH—					
Surat Navsari (Surti)	10	2	18	—	30
Brocach (Unspecified)	42	18	63	11	134
Total	52	20	61	11	164
DHOLLERAS—					
Mattheo	51	—	32	3	86
Cutch	—	—	7	—	7
Wagad	—	—	1	—	1
Dholleras (Unspecified)	3	—	73	6	82
Total	54	—	113	9	176
SOUTHERNS—					
Kumpatis (Jayawant)	—	—	—	—	—
Kumpatis (Unspecified)	—	—	—	—	—
Westerna (Jowari and Mungan)	19	—	45	—	66
Northerns	12	—	8	—	29
Cocona las (and Warangal)	15	13	—	—	31
Karunganni	5	1	3	—	9
Tinnevellyes	9	4	42	—	55
Salem	1	1	—	—	2
Total	64	19	95	2	182
COMILLAS	52	11	5	1	69
BGRMAS (Wagalo and Wagvi)	1	2	8	—	9
OTHER SORTS (Unclassified)	4	1	2	5	12
ORDINARY TOTAL	963	429	1,535	124	3

Total exports, as per official returns, from British Indian and Kathiawar Ports—Bales of 400 lbs net

1,097

2,002

134

* Standard Indian bales of approximate weight 400 lbs. and net

RECEIPTS AT MILLS IN INDIA OF

(Compiled from returns

1st September 1935 to

(In thousand bales*)

Trade Descriptions of Cotton	Bombay Island	Ahmed abad	Rest of Bombay Presidency	Total Bombay Presidency	Madras Presidency	United Provinces	C.P & Berar	Bengal	Punjab and Delhi	Rest of British India
DANALS—										
United Provinces	11	—	1	12	—	—	1	12	28	—
Punjab	19	1	2	22	—	92	6	1	16	2
Sind	6	3	—	9	—	—	—	—	—	18
Rajputana	16	1	—	17	—	2	—	—	—	—
Others	5	—	—	8	—	—	—	—	—	—
Total	69	5	3	69	1	100	1	15	44	20
OOMRAS—										
Central Provinces Oomras	23	—	—	23	—	3	53	10	—	—
Berar Oomras	22	1	1	24	—	3	31	—	—	—
Khandesh—Bawilla	5	—	18	23	—	—	8	—	—	—
Khandesh Oomras	19	1	15	55	—	4	—	—	—	—
Central India—Malvi	10	13	—	23	—	12	—	—	—	—
Central India—Others	35	3	2	42	—	—	—	—	—	—
Barsi and Nagar Oomras	7	—	19	26	—	—	—	—	—	—
Total	122	18	56	196	—	22	86	14	—	—
VERUM 282	4	1	1	6	—	—	25	—	—	—
HYDERABAD GAZRIYAT	20	—	37	57	—	—	15	—	—	—
Total	24	1	38	63	—	—	39	—	—	—
AMARCAKS—										
Punjab—239 F (and New Types)	26	5	1	32	6	1	—	8	13	—
Punjab (Unspecified—4 F)	79	2	—	62	35	26	4	35	35	—
S. of Sindh (239 F and F—1)	41	16	1	55	20	—	—	1	—	—
S. of (Unspecified—4 F)	44	11	2	57	30	—	—	2	—	—
Dharwar (Gadig I)	5	—	1	6	—	—	—	—	—	—
Dharwar (Upland—Unspecified)	9	1	3	13	—	—	—	—	—	—
Cambodia (Cumbatore No 2)	4	1	2	7	110	—	2	2	—	—
Cambodia (Unspecified)	12	2	2	16	54	—	2	5	—	—
Total	220	35	13	271	242	67	7	51	48	6
BAGACH—										
Surat Navari (Surti)	36	63	7	106	—	—	1	1	—	—
Brocach (Unspecified)	76	53	3	129	1	—	—	2	—	—
Total	112	113	10	255	1	—	1	3	—	—
DEOLAKHAS—										
Maitba	16	1	—	16	—	—	—	—	—	—
Cutch	1	—	—	1	—	—	—	—	—	—
Winged	6	96	3	105	—	—	—	—	—	—
Deolakhas (Unspecified)	16	10	2	27	—	—	—	—	—	—
Total	41	107	4	132	—	—	—	—	—	—
SHUTTAS—										
Kamptia (Siyawant)	31	2	8	41	9	—	—	1	—	—
Kamptia (Unspecified)	34	1	20	55	2	—	—	—	—	—
Westernas (Jowai and Meangul)	37	3	35	73	20	—	—	5	—	—
Northeras	2	—	—	2	12	—	—	4	—	—
Cocanadas (and Warangal)	1	—	2	3	4	—	—	2	—	—
Karnataks	9	—	1	47	—	—	—	—	—	—
Tinnevellyes	3	—	1	4	64	—	—	2	—	—
Salems	—	—	—	5	—	—	—	—	—	—
Total	109	8	66	161	159	—	—	12	—	—
COTTONS										
Buwanai (Wagai and Wagy)	—	—	—	—	—	—	—	2	—	0
Orissa Sonts	1	—	1	2	3	—	—	1	—	—
Total India Cotton	839	239	191	1268	405	1219	133	95	97	35
AMARCAKS										
Enviriasa	21	2	—	23	1	—	—	1	—	—
East Africas	21	32	1	34	5	—	—	2	—	—
Prasas (India, Mysopotamia etc.)	86	100	12	193	4	—	—	8	2	—
Total East Africa Cotton	13	3	3	21	—	—	—	1	—	—
GRAND TOTAL	141	139	18	295	6	—	—	13	3	—
Iussia India cotton consumed in India in India. (Figures compiled mainly from returns under the India Cotton Crop Act—Value of 600 lbs. net)	830	422	237	1441	415	709	133	109	95	35
	844	321	204	1189	375	317	13	99	90	34

* Standard Indian bales of approximate average

XIV.

RAW COTTON CLASSIFIED BY VARIETIES.

furnished by Mills)

31st August 1936

of 400 lbs each)

Total British India	Hyder abad	Mysore	Bardia	Gwalior	Indore	Kathawar States	Other Ind. an States	Pondi cherry	Total Indian States	Grand Total	Trade Descriptions of Cotton
145	—	—	—	13	—	—	4	—	17	162	Bengals—
47	—	2	—	—	—	—	1	—	3	56	United Provinces
10	—	3	—	—	1	2	1	—	3	15	Punjab
37	—	—	—	—	—	—	6	—	12	49	Sind
8	—	—	—	—	—	—	—	—	—	6	Rajputana
247	—	9	—	14	2	1	13	—	35	282	Others
89	—	—	—	—	—	—	2	—	3	92	Total
60	—	—	—	—	—	—	1	—	—	61	OOMRAS—
34	—	—	—	—	—	—	—	—	—	24	Central Provinces Oomras
38	—	—	—	—	—	—	—	—	—	36	Berar Oomras
27	—	—	—	7	54	68	—	10	—	159	Khandesh—Bamila
56	—	1	—	—	1	26	—	3	—	87	Khandesh Oomras
26	—	—	—	—	—	—	—	—	—	23	Central India—Malwa
318	1	—	7	55	94	—	16	1	174	492	Central India—Others
29	—	—	—	4	—	—	—	—	—	25	Bamila and Nager Oomras
72	23	—	—	—	—	—	—	—	—	24	Total
101	23	—	1	—	—	—	—	—	—	125	VISAM 262
80	—	—	—	1	8	—	—	3	—	82	HYDERABAD GAORANI
286	—	6	—	19	—	—	2	—	30	PUNJAB—289 F (and New Types)	
61	—	—	1	—	—	—	—	—	—	61	Punjab (Unspecified—4 F)
69	—	—	1	—	—	—	—	—	—	61	Sind Sudhar (289 F and F—1)
6	—	—	—	—	—	—	—	—	—	6	Sind (Unspecified—4 F)
13	—	—	—	—	—	—	—	—	—	14	Dhawar (Gadag 1)
120	—	2	—	—	—	—	5	—	6	Dhawar (Upland—Unspecified)	
77	—	1	—	—	—	—	1	—	2	Cambodia (Comptatores Kp 2)	
712	—	6	2	20	—	2	11	6	49	701	Cambodia (Unspecified)
108	—	—	5	1	1	6	—	2	16	Total	
152	—	—	4	—	2	—	—	1	6	140	GAOCH—
240	—	—	9	1	5	2	2	3	24	Suri (Kashmiri (Suri))	
18	—	—	—	1	—	—	6	—	—	26	Gaoch (Unspecified)
105	—	—	—	6	—	—	12	1	—	134	Total
27	—	—	—	—	1	—	—	—	1	23	DUCKLESS—
153	—	—	10	—	1	25	1	—	37	Minibro	
42	—	—	—	—	—	—	—	—	—	4	Cutch
27	—	9	17	—	—	—	—	—	—	76	Winged
23	—	9	15	—	—	—	—	—	—	120	Dhakless (Unspecified)
14	—	4	6	—	—	—	—	—	—	28	DUCKLES—
11	—	—	—	—	—	—	—	—	—	13	Westerns (Jowai and Mangeri)
50	—	—	—	—	—	—	—	—	—	50	Northerns
62	—	—	—	—	—	—	—	—	—	72	Cordadas (and Warangal)
5	—	—	—	—	—	—	—	—	—	6	Jhinganam
352	7	40	2	—	—	—	11	5	65	Jaunvelles	
—	—	—	—	—	—	—	—	—	—	617	Salema
11	—	—	—	—	—	—	—	—	—	11	Total
8	—	5	—	—	—	—	—	—	—	11	LOWILLES—
—	—	—	—	—	—	—	—	—	—	—	Jauna (Wagala and Nagyl)
—	—	—	—	—	—	—	—	—	—	—	Jauna Soote
2139	31	63	31	93	100	54	54	15	413	Entallades Cotton	
24	—	—	—	—	—	—	—	—	—	25	AMERICANS
62	—	5	3	—	—	—	—	—	—	72	PAVILLES
213	—	—	16	1	1	3	—	—	22	ART AFRICANS	
22	—	—	—	—	—	—	—	—	22	JOYRIES (Dadar, Maharashtra, etc.)	
321	—	2	21	1	1	3	—	1	32	Total Foreign Cotton	
2460	31	63	52	21	101	2	34	16	415	GRAND TOTAL	
2122	62	51	53	72	112	27	92	20	416	Inches raw cotton received in India in India. (2 quire supplied mainly from various countries India Cotton Com. Act—Para 1 60 lbs net.)	

gross weight 400 lbs and net weight 302 lbs of cleaned

APPENDIX XX

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31ST 1936

INDIAN CENTRAL COTTON COMMITTEE OFFICE

1. Secretary	Mr P H. Rama Reddi, M.A., B.Sc I.A.S.	On deputation from Madras Department of Agriculture.
2. Publicity Officer	Mr R D Mishra M.A. Agric (Oxon) Post Ord. D.P. Agric (Oxon) Post Grad. Res. B.Lit (Oxon)	—

TECHNOLOGICAL LABORATORY, BOMBAY

3. Director	Dr Nazr Ahmad M.Sc Ph.D (Cantab) F Inst P	Late Head of Science Department, Islamia College Lahore and Asstant Director Technological Laboratory Matunga Bombay
4. Spinning Master	Mr R P Richardson F.T.I	Demonstrator (Cotton Spinning) Technical College Oldham
5 Senior Research Assistant (Chemist)	Mr D L Sen M.Sc Tech (Manch) M.Sc (Born) A.I.I. Sc A.I.C	Research Student at the Indian Institute of Science and Manchester College of Technology
6. Senior Research Assistant (Physicist)	Mr N Han Rao M.Sc (Calcutta)	Research Scholar Technological Laboratory (Textile Physics)
7 Senior Research Assistant (Physicist)	Mr Ram Saran Krishan M.Sc (Punjab)	Research Scholar Technological Laboratory (Textile Physics)
8 Junior Research Assistant (Micro Scopeist)	Mr Amar Nath Oulast M.Sc (Punjab)	Imperial Institute of Veterinary Research Mukteswar U.P
9 Junior Research Assistant	Mr C Nanjundayya, M.Sc (Calcutta)	Research Scholar Technological Laboratory (Textile Physics)

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31st 1936—contd

		TECHNOLOGICAL LABORATORY BOMBAY—contd	
10	Junior Research Assistant	Dr K. R. Sen D.Sc (Dacca)	Research Scholar Technological Laboratory and Technological Assistant Lyallpur Statistical Assistant, Labour Office Government of Bombay, Bombay
11	Statistician and Personal Assistant	Mr V. Veekalaraman M.A (Madras)	—
12	Temporary Chemist	Dr Lavy Thora Dr Ing (Germany)	—
13	Electrician	Mr Horace Lobo Lee (V.J.T.I.)	—
14	Spinning Assistant	Mr N. Iyengar	—
15	Senior Tester	Mr H. B. Joshi, B.Sc	—
16	Senior Tester	Mr S. S. Suthaker L.T.C (V.J.T.I.)	—
17	Junior Tester	Mr K. G. Desai	—
18	Junior Tester	Mr B. G. Panvalkar, B.Sc	—
19	Junior Tester	Mr G. D. Bhide B.Sc	—
20	Junior Tester	Mr K. V. Nayyar	—
21	Junior Tester	Mr V. V. Modak B.Sc	—
22	Junior Tester	Mr L. V. Sundaresan B.A	—
23	Junior Tester	Mr P. S. Sambarumurthy	—
24	Junior Tester	Mr G. J. Kharkar, B.Sc	—
25	Junior Tester	Mr Sastoor Samson B.Sc	—
26	Junior Tester	Mr A. J. Farid	—
27	Junior Tester	Mr U. K. Bengal B.A	—

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31ST 1936—CONT'D

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GENETICOLOGICAL LABORATORY BOMBAY—concl'd

24	Junior Tester	Mr P V Venkatese B Sc
25	Junior Tester	Mr C S Ramanathan B Sc
30	Junior Tester	Mr S V Rao M Sc
31	Junior Tester	Mr B N Prabhakar B Sc
32	Draughtsman	Mr B G Mehta
33	Statistical Clerk	Mr R Krishna Iyer
34	Statistical Clerk	Mr P K Wagle
35	Merchandise	Mr J B Kharsa

INSTITUTE OF PLANT INDUSTRY, INDORA

36	Director	Mr T R Low, B Sc. (Agric) (London), I A S	Principal Agricultural College, Cawnpore On deputation from the United Provinces Department of Agriculture.
37	Geneticist and Botanist	Mr J B Hutchinson, M A (Cantab)	.. Assistant Geneticist and Botanist, Trinidad (1926-33)
38	Chemical Agronomist	Mr Y D Wed, M A, M Sc (Bombay) AIISc	Research Student, Indian Central Cotton Committee
39	Farm Superintendent	Mr G C Tambo, B Ag (Bombay) ..	..
40	Extension Officer	Mr Huber Singh, B Ag (Bombay) ..	..
41	Senior Botanical Assistant	Mr R L M Ghose, M Sc (Alahabad)	..

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S
Funds AS ON AUGUST 31st 1936—contd

		INSTITUTE OF PLANT INDUSTRY REPORT—contd						
		Mr S C Talesara B Ag (Bombay)	Research Student Cotton Committee	Indian Central				
42	Assistant Farm Superintendent	Mr A V Srivastava M Sc (Lucknow)	Research Student Cotton Committee	Indian Central	—	—	—	—
43	Personal Assistant	Mr V G Panse B Sc (Bombay)	Research Student Cotton Committee	Indian Central	—	—	—	—
44	Statistical Assistant	Mr Bhola Nath M Sc (Punjab)	Research Student Cotton Committee	Indian Central	—	—	—	—
45	Geological Assistant	Mr C P Dutt M Sc (Calcutta)	Research Student Cotton Committee	Indian Central	—	—	—	—
46	Plant Breeding Assistant	Mr K M Sankotio B Ag (Nagpur)	King Edward Memorial Inland Research Scholar at I.P.I.	Indian Central	—	—	—	—
47	Farm Assistant	Mr P D Gadkari M Sc (Nagpur)	King Edward Memorial Inland Research Scholar at I.P.I.	Indian Central	—	—	—	—
48	Botanical Assistant	Mr M A Ansari M Sc (Lucknow)	Research Student Institute of Plant Industry Indore	Indian Central	—	—	—	—
49	Queen's Plant Breeding Ass'tant	Mr R K Aurangzabdar M Sc (Allahabad)	Do	Do	—	—	—	—
50	Chemical Ass'tant (Temporary)	Mr K V Ambegaonkar M Sc (Bijcarao)	Do	Do	—	—	—	—
51	Geographical Ass'tant (Temporary)	Mr V N Bhargava, B Sc (Allahabad)	Do	Do	—	—	—	—
52	Junior Farm Ass'tant (Temporary)	Mr S S Gangadhar Bhote B Ag (Bombay)	—	—	—	—	—	—
53	Junior Farm Ass'tant (Temporary)	Mr J S Onear	—	—	—	—	—	—
54	Artist	BOMBAY RESEARCH SCIENCES	(a) Branch Cotton Breeding Scheme	—	—	—	—	—
			Mr P L Patel M Sc (Iowa U.S.A.)	—	—	—	—	—

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S
FUNDS AS ON AUGUST 31st 1935—*contd.*

TECHNOLOGICAL LABORATORY BOMBAY—*contd.*

28	Junior Tester	Mr P V Nachane B Sc
29	Junior Tester	Mr C S Ramanathan B Sc
30	Junior Tester	Mr S N Rao M Sc
31	Junior Tester	Mr B N Prabhakar B Sc
32	Draughtsman	Mr B G Mehta
33	Statistical Clerk	Mr R Krishna Iyer
34	Statistical Clerk	Mr P K Wagle
35	Mechanic	Mr J B Kharsa

INSTITUTE OF PLANT INDUSTRY, JAPONS

36	Director	Mr T R Low, B Sc, (Agric) (London) F A.S
37	Geneticist and Botanist	Mr J B Hutchinson M A (Centab)
38	Chemist and Agronomist	Mr Y D Wad M A, M Sc (Bombay) A.I.I.Sc
39	Farm Superintendent	Mr O G Tambo B Ag (Bombay) ..
40	Extension Officer	Mr Kubur Singh B Ag (Bombay) ..
41	Senior Botanical Assistant	Mr R L M Ghose M Sc (Allahabad) ..

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31ST 1936—*contd*

INSTITUTE OF PLANT INDUSTRY, UDONI—*contd*

				Research Student Cotton Committee	Student Indian Committee	Indian Central
42	Assistant Farm Superintendent	Mr S C Tulsars B Ag (Bombay)				
43	Personal Assistant	Mr A. N Srivastava M Sc (Lucknow)				
44	Statistical Assistant	Mr V O Panse B Sc (Bombay)				
45	Farm Technical Assistant	Mr Bhola Nath M Sc (Punjab)	Research	Student Cotton Committee	Indian Central	
46	Plant Breeding Assistant	Mr C P Dutt M Sc (Calcutta)				
47	Technical Assistant	Mr K M Sankole B Ag (Nagpur)				
48	Technical Assistant	Mr P D Godkarn M Sc (Nagpur)	King Edward Memorial Inland Research Scholar at I.P.I			
49	House Master Breeding Assistant	Mr M A Ansari M Sc (Lucknow)	Research Student, Institute of Plant Industry, Indore			
50	Chemical Assistant (Temporary)	Mr R K Turangabehkar M Sc (Aligarh)	Do			
51	Experimental Farm Assistant (Temporary)	Mr K N Andlegonkar M Sc (Benares)	Do			
52	Junior Farm Assistant (Temporary)	Mr V N Dhargava B Sc (Aligarh)	Do			
53	Junior Farm Assistant (Temporary)	Mr R S Gangadhara Bhoota B Ag (Bombay)				
54	Technician	Mr J S Ober				
		BOMBAY RESEARCH STATION				
		(1) Brooch Cotton Breeding Scheme				
		Mr P L Patel M Sc (Iowa U.S.A.)				

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31ST 1930—*contd.*

56	Botanical Assistant	Mr B J Thakar B Ag (Bombay)	On deputation from Bombay Department of Agriculture —
57	Pathological Assistant	Mr Y S Kulkarni B Ag (Bombay) (i) <i>Jalgaon Cotton Breeding Scheme</i>	On deputation from Bombay Department of Agriculture —
58	Botanical Assistant	Mr V L Bhoskar, B Ag (Bombay)	On deputation from Bombay Department of Agriculture —
59	Pathological Assistant	Mr. J D Panadive B Ag (Bombay)	Research Student, Indian Central Cotton Committee.
BOMBAY SEED DISTRIBUTION SCHEMES			
(i) <i>Surat Scheme</i>			
60	Cotton Assistant	Mr V D Desai	On deputation from Bombay Department of Agriculture —
61	Cotton Assistant	Mr V V Patel, B Ag (Bombay) (ii) <i>Khandesh (Banilla) Scheme</i>	Do do
62	Cotton Superintendent, Arnalner	Mr S V Shinde, L Ag	On deputation from Bombay Department of Agriculture —
63	Agricultural Overseer	Mr R B Nimbalkar, B Ag (Bombay)	Do do
64	Superintendent, Bhadrgaon Farm	Mr D M Kulkarni, D Ag (Bombay)	Do do
(iii) <i>B D S Scheme</i>			
65	Agricultural Overseer	Mr D A Dave, B Ag	

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31st 1936—*contd*

BOMBAY SEED DISTRIBUTION SECRETARIALS—*contd*

		(iv) <i>Jaygaran Scheme</i>	
66	Agricultural Overseer	Mr B S Taddeo B Ag (Bombay)	
67	Agricultural Overseer	Mr B M Dhoomna D Ag (Bombay)	
68	Agricultural Overseer	Mr D V Hrenath D Ag (Bombay)	
69	Agricultural Overseer	Mr S M Teprashth D Ag (Bombay)	
70	Agricultural Overseer	Mr V H Halgali D Ag (Bombay)	
71	Agricultural Overseer	Mr B S Patil B Ag (Bombay)	
72	I r e v i n a l f M o o r	BOMBAY COTTON FORECAST IMPROVEMENT SCHEME Mr G R Umbekar School Final	On deputation from Bombay Department of Agriculture
73	Cotton 17 yrs 1 & 2 st Sakerni	SARD PHYSIOLOGICAL RESEARCH SECRETARIAL	
74	R e m o r t A s s i s t a n t	Mr B M Debral M Sc (Benares)	
75	J u n i o r A s s i s t a n t	Dr A M Shaikh M Sc (Bombay) Ph D (London) DIC AIC	
76	J u n i o r A s s i s t a n t	Mr Rustam M Raoj D P Ag (Bombay)	
77	J u n i o r A s s i s t a n t	Mr H W Mughal D P Ag (Bombay)	On deputation from Bombay Department of Agriculture
		Mr T J Mallam M Sc (with distinction) (Bombay)	

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE,
FUND AS ON AUGUST 31st 1936—contd

SIND SEED DISTRIBUTION SCHEME

78	Statistical Assistant	Mr S S Chatur, B.Sc (Agr)	..	Research Student, In hon Central Cotton Committee, on deputation from Sind Department of Agriculture
79	Cotton Supervisor, In us Left Bank Marpurkhan	Mr H A Idman, B.Ag (Bombay) ..	..	On deputation from Sind Department of Agriculture
80	Cotton Supervisor, In us Right Bank Dadu	Mr W P Shahani B.Ag (Bombay)	..	On deputation from Sind Department of Agriculture
81	Senior Assistant to Cotton Supervisor India's Right Bank	Mr Agha Khan Mahomed Zycava Jallpur Courtie	Do	do
82	Senior Assistant to Cotton Supervisor India's Left Bank	Mr A R Aram B.Ag (Bombay) CID (Manchester)	Do	do
83	Junior Assistant to Cotton Supervisor India's Right Bank	Mr Lokhara	Do	do
84	Junior Assistant to Cotton Supervisor India's Right Bank	Mr W R Shabani	..	—
85	Junior Assistant to Cotton Supervisor, India's Right Bank	Mr Gulalikh Umardesh	..	On deputation from Sind Department of Agriculture
86	Junior Assistant to Cotton Supervisor In us Right Bank	Mr Premsing T Advani	..	—
87	Junior Assistant to Cotton Supervisor, India's Left Bank	Mr S A Sidiki, Dip Agr (Bosby)	..	—
88	Junior Assistant to Cotton Supervisor India's Left Bank	Mr K S Tharman	..	On deputation from Sind Department of Agriculture
89	Junior Assistant to Cotton Supervisor, India's Left Bank	Mr T T Narandas	..	—

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31ST 1936—contd

SUND SEED DISTRIBUTION SCHEME—contd

99	Junior Assistant to Cotton Supervisor In Jus Left Blank.	Mr. Joe D Alvan B.Ag (Bombay)	On deputation from Sund Department of Agriculture
91	Junior Assistant to Cotton Supervisor In Jus Left Blank.	Mr Lachmandas	—
22	Junior Assistant to Cotton Supervisor In Jus Left Blank	Mr A. Q. Prada B.Ag (Bombay)	On deputation from Sund Department of Agriculture
43	Junior Assistant to Cotton Supervisor In Jus Left Blank	Mr H N Polaha B.Ag (Bombay)	—

CENTRAL PROVINCES RESEARCH SCHMEEES

	(a) Botanical Scheme	(b) On deputation from Central Provinces Department of Agriculture	(c) On deputation from Central Provinces Department of Agriculture
94	Researcher Botanist for Cotton	Mr D V Maitta B.A (Orissa) P.L.S	Do
01	Assistant to Economic Botanist for Cotton	Mr S C Roy L.Ag and Post Graduate Pusa	Do
4	Assistant to Economic Botanist for Cotton	Mr Q S Jani & M Sc (Punjab)	Research Student Central Cotton Committee
97	Assistant to Economic Botanist for Cotton	Mr D G Sawarkar L.Ag (Hons)	On deputation from Central Provinces Department of Agriculture
95	Assistant to Economic Botanist for Cotton	Mr D L Jaiswal L.Ag (Hons)	Do
92	Venakari Cotton	Mr D L Jaiswal L.Ag (Hons)	Do
102	Assistant to Economic Botanist for Cotton	Mr V N Parmane B.Sc	do

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31ST 1936—contd

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CENTRAL PROVINCES RESEARCH SCHEMES—contd

(ii) *Entomological Schemes*

101 Agricultural Ass'tant Mr M S Patel B.Ag

COMBINED LONG STAPLE COTTON AND MARKETING OR VENOM COTTON SCHEMES IN C.P. AND BRAH

102	Agricultural Ass'tant	Mr J P T wari B.Ag
103	Agr cultural Ass'tant	Mr L P Khare B.Ag
104	Agricultural Assistant	Mr O N Wardakar B.Ag
105	Agr cultural Ass'tant	Mr L B Deshpande B.Ag
106	Agricultural Ass'tant	Mr N B Chinchollar B.Ag
107	Agricultural Ass'stant	Mr J N Kellar B.Ag
108	Agricultural Ass'tant	Mr G C Tiwari Certificate Course of Agricultural College Nagpur
109	Agricultural Assistant	Mr W R Patwardhan B.Ag
110	Agricultural Ass'tant	Mr M D Anadeo B.Ag
111	Agricultural Ass'tant	Mr Rafat Ali Haqqani B.Ag
112	Agricultural Ass'tant	Mr K Sheoran Singh Chowhan B.Ag
113	Agricultural Assistant	Mr R S Shivalkar B.Ag
114	Agricultural Assistant	Mr V S Hungankar B.Ag

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S
Funds as on August 31st 1936—*contd*

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Madras Research Schemes

S. No.	Post	Name	Qualification	Deputation from	Central
(i) <i>Herbaceous Scheme</i>					
115	Gazetted Assistant	Mr R Balasubramania Ayyar	B.A. B.Sc	On deputation from Madras Department of Agriculture	
		(Ag.)		—	
116	Junior Assistant	Mr G Seshadri Ayyanger	M.A.	—	
117	Junior Assistant	Mr V Narasimham Mudaliar	B.A.	—	
118	Sub Assistant	Mr D Devasuravatham	S.S.L.C. (Botany)	On deputation from Madras Department of Agriculture (Intermed. ato)	
(ii) <i>Pumpkins and Physiological Scheme</i>					
119	Phyto Chemist	Dr S Kasnath Ayyar	B.A. Ph.D	On deputation from Madras Department of Agriculture	
120	Professor General Plant at (Lon Jon)	Mr T R Venkatese Ayyar	B.A. (Cantab), B.Sc. (Ag.)	Do	do
121	Assistant Professor	Mr P V Krishna Ayyar	B.A.	Do	do
122	Assistant Professor	Mr K Dharmaraju	M.Sc. (Bombay)	Research Student Cotton Committee	Indian Central
123	Assistant Professor	Mr V Margabhan lu	M.A.	On deputation from Madras Department of Agriculture	
124	Ass. Scientist Plant at	Mr V V Narayanan	B.Sc. (Ag.)	—	
125	Ass. Scientist Plant at	Mr P S Narayanaswami	B.Sc. (Ag.)	On deputation from Madras Department of Agriculture	
126	Assistant C. I. T. at	Mr R Saptharishi	B.Sc. (Ag.)	—	
127	Ass. Scientist Plant at	Mr S Anantham	B.Sc. (Ag.)	—	

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31ST 1935—*contd.*

MATRAS RESEARCH SCHEME—CONT'D

(iii) Fodder Chelam Scheme

Mr M R Balakrishnan B.A, B.Sc (AGRI)

Mr S Sundaram, B.A. B.Sc (AEI)

Proceedings of Academic Council

Mr R Krishnamurthy B Sc (Ag.)

Large Scale Distribution Services

Pay and Allowances of Business Manager

Mr. K. Virendra Sekharam Pillai 998

LA^g

(iii) C_0 2 Scheme

Mr Damodara Prabhu, B.Sc (Agri)

Mr L Knochend H.A. Ness (AEM)

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THE LITERATURE OF THE VENETIAN REPUBLIC

Pavaya Heterocyclic Benzene

(1) Botanical Survey

137 Cotton Research Board

A.I.G.T.A (Trinidad) Cotton Committee and State Research Scholar On deputation from Piarco Department of Agriculture

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S
FUNDS AS ON AUGUST 31st, 1936—contd

PUNJAB RESEARCH SCHOLARS—contd

(i) Botanical Scheme—contd		On deputation from Punjab Department of Agriculture,	
135.	Assistant to Cotton Research Botanist U.S.A	Chaudhri Mohammad Akbar, I.A.G. Ph. Sarup Singh I.A.G., M.Sc (Texas)	Do do
136.	Agricultural Assistant	Th. Ranbir Singh B.Sc (Agric.)	Do, do,
140.	Agricultural Assistant	B. Kehr Singh, B.Sc (Agric.)	Do, do,
141.	Agricultural Assistant	Bh. Autar Singh, B.Sc (Agric.)	—
142.	Agricultural Assistant	Bh. Santokh Singh, B.Sc (Agric.)	On deputation from Punjab Department of Agriculture,
143.	Agricultural Assistant	Q. Patach Ali Shah, B.Sc (Agric.)	Do
144.	Agricultural Assistant	Ch. Hanishi Ram, B.Sc (Agric.) Gold Medalist	—
145.	Agricultural Assistant	Mr S. E. Dassau, L.C (Course)	On deputation from Punjab Department of Agriculture
146.	Agricultural Assistant (B.Care)	Ch. Mohammad Rashid Khan, I.G. Course, Munshi Fazal, F.A (Punjab University)	Do
147.	Technical Assistant	Mr Bhagat Ram Sehgal, M.A (Punjab)	—
148.	Statistical Assistant	(ii) Entomological (Pink and Spotted Boll worm) Scheme	—
149.	Assistant Cotton Entomologist	Mr M. Haroon Khan, B.Sc (Honors) (London), A.R.C.S (London)	—

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31ST 1936—cont'd

PUNJAB RESEARCH SCHEMES—cont'd

(ii) *Entomological (Pink and Spotted Boll worm) Scheme—contd*

150	Field Assistant Research Work	Mr La Iha Ram B Sc	Research	Student	Indian	Central
151	Field Assistant Research Work	L Ganja Ram H Sc F E L				
152	Field Assistant Research Work	Mr Phare Mohan, B Sc (Hons) M Sc				
153	Field Assistant Research Work	Mr Manzoor Abbas B Sc (Agri)				
154	Field Assistant Research Work	Mr Ghulam Ullah, B Sc (Agri)				
155	Research Assistant	Mr Abdul Ghani B Sc. (Agri)				
156	Research Assistant	Mr Dharm Br Kohli B Sc (Agri)				
		(iii) <i>White Fly Scheme</i>				
157	Assistant Cotton Entomologist	L Kesar Nath Trehan M Sc (Punjab)	Research	Cotton Committee		
158	Field Assistant	Mr Hari Chand B Sc (Agri)				
		(iv) <i>Root Rot Scheme</i>				
159	Assistant Cotton Mycologist	Dr R S Vasudeva B Sc Ph D (London) D I C (London)				
160	Agricultural Assistant	Mr Mohd Ashraf B Sc (Agri)				
161	Agricultural Assistant	Ch Moh J Rafiq M Sc (Hons)				

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S
Funds as on AUGUST 31st, 1936—contd

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PUNJAB RESEARCH SCHMIES—contd

(v) *Physiological (Periodic Partial Posture) Scheme*

		Prof R H Dastur M Sc, F L S	Mr S S Verma M Sc (Botany)	Mr S S Verma M Sc (Botany)	On deputation from Bombay Educational Department
162	Plant Pathologist	Dr K M Santant M Sc Ph D	—	—	—
163	Assistant Pathologist and Microscopist	Dr S S Verma M Sc (London) DIC	—	—	—
164	Bio Chemist	Mr V A Ahad, B Sc (Agri)	—	—	—
165	Chemical Assistant	Bh Sucha Singh, B Sc (Agri)	—	—	—
166	Physiological Assistant	Mr Kanwar Krishan M A (Punjab)	—	—	—
167	Radiotactical Assistant	Mr Mukhtar Singh, B Sc (Agri)	—	—	—
168	Fertilizer Assistant	United Provinces' KOTLIKHAND AND BUNDELKHAND SURVEY SCHEME	—	—	—
169	Agricultural Inspector	Mr Atar Singh, L I G (Cawnpore)	On deputation from the United Provinces Department of Agriculture	H M P N A HAD RESEARCH SCHMIES	—
170	Cotton Research Botanist	Mr Sahib Kalidas Sawhney M Sc (Punjab)	Late Cotton Breeder in the Department of Agriculture, Iraq, Baghdad	(vi) <i>Botanical Scheme</i>	On deputation from Bombay Department of Agriculture
171	Assistant Cotton Research Botanist	Mr D V Narayanan & Dip Agrn (Poona)	On deputation from H E H the Nizam's Department of Agriculture	Mr V K Bederker, B.A. (Madras), B Ag (Bombay)	On deputation from H E H the Nizam's Department of Agriculture
172	Cotton Research Botanist	Mr V R Yardi, B Ag (Bombay)	—	—	—
173	Inspector Variety Testing Stations	—	—	—	—

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31ST 1936—*contd*

*HYDERABAD RESEARCH SCHMES—*contd**

(i)	<i>Hyderabadi (Pink and Spotted Boll worm) Scheme</i>	
174	Cotton Entomologist	Mr H D Nangpal M Sc (Punjab) Research Student Indian Central Cotton Committee and Assistant Entomologist United Provinces Pink Boll worm Scheme —
175	Senior Research Assistant	Mr N T Nedkanty B Ag (Bombay) Post Graduate Course in Entomology at Poona Agricultural College —
176	Junior Research Assistant	Mr T L Krishnamurthy B Sc (Agric) (Cotton bates) —
177	Inspector	Mr M V Chinnus —

BARODA RESEARCH SCHMES

(i)	<i>Root Rot Scheme</i>	
178	Cotton Breeder	Mr M S Pandya B Ag (Bombay) B Sc On deputation from Bombay Department of Agriculture —
179	Breeding Assistant	Mr A F Patel, B Ag (Bombay) —
180	Mycological Assistant	Mr G H Desai B Ag (Bombay) —
181	Field Assistant	Mr V G Kulkarni —
182	Field Assistant	Mr M C Patel —

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31ST 1939—contd

BARODA RESEARCH SCHEMES—contd

(a) *Plant Path & Propaganda Scheme*

Mr I. V. Desai B.Ag

Mr R. S. Patel

BIGANER GANGA CANAL SCHEME

Mr Upendra Singh B.Sc

BEGOAL COMILLA COTTON SCHEME

Mr H. K. Majumdar M.Sc

MYSORE (DODDABALLI) SCHEME

Mr K. Gopala Iyengar M.Sc (Bombay)

Mr Girishas Iyengar M.Sc (Mysore)

TECHNOLOGICAL ASSISTANTS PAID BY INDIAN CENTRAL COTTON COMMITTEE

183 Plant Research Officer Mr R. L. N. Iyengar B.Sc

184 Plant Path & Propaganda Officer Mr H. R. Nayak Inter Science (Madras)

185 Cotton Ass'tant Mr R. L. N. Iyengar B.Sc

186 Cotton Research Officer Mr H. R. Nayak Inter Science (Madras)

187 Junior Assistant B.Sc Mr R. L. N. Iyengar B.Sc

188 Entomologist Mr H. R. Nayak Inter Science (Madras)

189 Under Officer Research Officer Mr S. Raju Ramam B.A. (Madras) M.Sc

190 Under Director of Agriculture Mr Srivangabai Velana B.Sc (Mysore)

191 Under Officer Research Officer Mr S. Raju Ramam B.A. (Madras) M.Sc

192 Under Director of Agriculture Mr Srivangabai Velana B.Sc (Mysore)

193 Under Officer Research Officer Mr K. S. Marar B.A. LL.B

Mr A. M. Nakrani

APPENDIX XVI
RESEARCH STUDENTSHIPS

Year of appointment	Name	Where posted on appointment	Branch of Cotton Research in which scholarship granted	How now employed	Remarks
1923	Sohan Singh Bindra M.Sc Hencurs School (Punjab)	Lyalpur	Cotton Entomology	Late Assistant Entomologist Pink Boll-worm Research Scheme, Recently in Agricultural Department, Kenya	Indian Central Cotton Committee
"	Mohammed Afzal, B.Sc (Punjab)	Do	Cotton Botany (Plant Breeding)	Punjab Agricultural Department Research Punjab Botanical Research Scheme Assistant to Economic Central Provincial Botanical Research Scheme	Do
"	Sheo Shankar Pande, M.Sc (Punjab)	Nagpur	Do	Member in Botany, Khalsa College, Amritsar	Late Senior Mycological Assistant, Central Provinces Witt Investigation Scheme
"	Jiwan Singh M.Sc (Punjab)	Do	Cotton Mycology	University Botany, Calcutta University, from January 1929	Held a Senior Research Studentship under Dr M. A. Sampath Kumar M.A., Ph.D., Central College, Bangalore, and at the Institute of Plant Industry Indore, from April 1926 to March 1928
"	Habanto Banerji, M.Sc (Calcutta)	Coimbatore	Cotton Botany	University Botany, Calcutta University, from 31st January 1929	

RESEARCH STUDENTSHIPS—contd

Year of appointment	Name	Where posted on appointment	Branch of Cotton Research in which scholarship granted	How now employed	Remarks
1923	R D. S. BAG (Burmay)	Dharwar	Cotton Botany	Senior Agricultural Department Cotton Breeder Sind Murarkhas	Held a Senior Research Studentship at the Institute of Plant Industry, Indore, from July 1926 to June 1927
1924	Mr. Chandra Pratta (Calcutta)	W. Q.C. incubator	Do	Lecturer in Botany Cotton College Gauhati Assam	Senior Research Assistant Indian Central Cotton Committee
1924	Harish M. QC (Calcutta)	Technological Textile Physics Research Laboratory Matunga Bombay	Textile Physics	Entomologist Hyderabad Link and Spotted Boll worm Scheme, Parbhani	Late Special Research Assistant, Pink Boll worm Investigation United Provinces Resigned in August 1924 to go to Cambridge for further study Obtained Ph.D
1924	P. N. Gangopadhyay (Mymensingh)	M. Sc. C. L. I. P. R. C. L. I. M. N. H. W. (Mymensingh)	Cotton Physiology	Cotton Physiology	United Provinces Q. Sub ordinates Agricultural Services
1924	A. K. Patel, H. R. Patel, T. A. Patel (Agricultural University, Lawra)	W. S. N. S. (Singapore) U. N. I. C. (Lawra)	Cotton Entomology	Cotton Entomology	Late Research Assistant under the Entomologist to Government Province—Pink Boll worm Investigation Scheme Indian Central Cotton Committee
1924	K. K. Nar. B. N. S. (Mymensingh)	J. Calcutta	Cotton Botany (Plant Breeding)	Punjab Agricultural Department Assistant Botanical Research Scheme	Punjab Agricultural Research Scheme

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APPENDIX XVI
RESEARCH STUDENTSHIPS

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Year of appointment	Name	Where posted on appointment	Branch of Cotton Research in which scholarship granted	How now employed	Remarks
1923	Sohan Singh Bhardwaj, M.Sc Honours School (Punjab)	Leylpur	Cotton Entomology		
"	Mohammed Afzal, B.Sc (Punjab)	Do	Cotton Botany (Plant Breeding)		
"	Sheo Shankar Pandit, M.Sc (Punjab)	Nagpur	Cotton Botany (Plant Breeding)	Do	
"	Jiwan Singh, M.Sc (Punjab)	Do	Cotton Mycology	Reader in Botany, Khalsa College, Amritsar	Late Senior Mycologist Central Agricultural Botanical Research Scheme Punjab Provinces
"	Gabonto Banerji, M.Sc (Calcutta)	Comptatore	Cotton Botany	University Botany, Calcutta University, from January 1920	Held a Senior Research Studentship under Dr M A Sampath Kumar, M.A., Ph.D., Central College, Bangalore, and at the Institute of Plant Industry, Indore, from April 1926 to March 1928

RESEARCH STUDENTSHIPS—contd

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of	Name,	Where posted on appointment	Branch of Cotton Research in which scholarship granted	How now employed	Remarks
"	M. S. Technological Research Laboratory Vatanga Bombay Sarkar	No. Tertile Physics Cotton Entomology	Senior Research Assistant (Physicist) Technological Research Laboratory, Mumbai, Bombay Sind Agricultural Department. Senior Assistant to Agricultural Chemist and Social Physician Sakrand	Indian Central Cotton Committee Institute of Plant Industry India Sind Agricultural Department Indus Right Bank, Sind Seed Distribution Scheme, Dadu Assistant Farm Supervisor Student, Institute of Plant Industry, Indore Technological Assistant Combatoore	Resigned in July 1927
"	Jalpur Gomhalore	Cotton Biochemistry	Chemist And Agronomist Institute of Plant Industry India Sind Agricultural Department Indus Right Bank, Sind Seed Distribution Scheme, Dadu Assistant Farm Supervisor Student, Institute of Plant Industry, Indore Technological Assistant Combatoore	Do	Do
"	H. Ag. (Bom)	Do	Do	Do	Do
"	H. Interumba Iyer B. N. (Myrene)	Tech nology Research Laboratory Mumbai	Cotton Technology Institute of Plant Cotton Industry, Indore	Assistant Chemist Lao Research Association	Secured Government Scholarship for study abroad and obtained Ph D (Cantab)
"	Govt Krishn Thakur, M. S. (Bom Bay)	Institute of Plant Industry, Indore	Cotton Biochemistry	Do	
"	Dev Lal Mohan Lal Honra School (Punjab)	Do	Cotton Entomology		

RESEARCH STUDENTS—contd

Year of appointment	Name	Where posted on appointment	Branch of Cotton Research in which scholarship granted	How, now employed	Remarks
1925	Rider Nath Trehan (Punjab)	M Sc Lyallpur	Cotton Entomology	Punjab Agricultural Department Assistant Cotton Entomologist White Fly Investigation Scheme, Punjab	Held Senior Research Studentship for study of "White Fly" problem at Khansawal Indian Central Cotton Committee Technological Assistant, Dhayari, up to 31st July 1929 Went abroad for further study Indian Central Cotton Committee
"	S E Kumana, B A, M Sc (Bombay)	Technological Research Laboratory, Matunga, Bombay	Cotton Technology		Resigned in July 1925
"	J D Ranadive D Ag (Bombay)	Dherwarr	Cotton Mycology		
"	P K Ray, M Sc (Dacca)	Technological Research Laboratory, Matunga, Bombay	Tortile Physics	Do	Technological Assistant Lyallpur
"	K R Sen M Sc (Dacca)	Do		Cotton Microscopy	Lecturer in Botany Central College Bangalore
"	L N Rao, M Sc (Calcutta)	Do		Cotton Technology	Head of the Tortile Manufacturers Department Victoria Jubilee Technical Institute, Bombay
1928	D F Kapadia, B A, (Born 1905), M Sc (Tech) (Manchester)	Do			Lst Senior Research Assistant, Assistant Technologist, Tech nological Research Laboratory, Matunga, Bombay

RESEARCH STUDENTSHIPS—contd

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Year of appointment	Name	Where posted on appointment	Branch of Cotton Research in which scholarship granted	How now employed	Remarks
1926	Ram Ram Krishan (Punjab)	Re Technological Research Laboratory Matunga, Bombay	Re Textile Physics	Senior Research Assistant (Physicist), Technological Research Laboratory, Matunga, Bombay	Indian Central Cotton Committee
"	H. A. Phama Iyengar, B.Sc (Mysore)	Cotton Physiology	Cotton Physiology	Senior Agricultural Department, Senior Assistant to Agricultural Chemist and B.Sc Physician Sakrand	Awarded a Training Grant for foreign study in 1933
"	Karan Nath Lamba, B.Sc (Panjab)	L.J. Hallur Hannover School (Panjab)	Cotton Entomology	Chemist and Agronomist, Institute of Plant Industry, Indore	Resigned in July 1927
"	" Y. D. Wad, " M.A. V. S. Ro (Bombay) A.I.I.R. (Baroda)	Coimbatore Institute of Plant Industry, Baroda	Cotton Biochemistry	Seed Agricultural Department, Cotton Supervisor India Right Bank, Sind Seed Distribution Scheme, Dadu	Indian Central Cotton Committee
"	H. H. Hans B.Sc (Baroda)	Institute of Plant Industry, Indore	Cotton Botany	Do	Do
"	S. C. Talsaria B.Sc (Dibr) (Assy)	Do	Do	Assistant Farm Superintendent, Institute of Plant Industry, Indoore	Do
1927	H. Lakshminarayana Iyer Sar B.Sc (Mysore)	Technological Research Laboratory, Matunga, Bombay	Cotton Technology	Technological Assistant, Indian Lac Research Association	Secured Government Scholarship for one year abroad in U.S.A.
"	Janardana Thakur, M.Sc (Bombay)	Institute of Plant Industry, Indore	Cotton Industry	Assistant, Chemist, Indian Lac Research Association	Secured Government Scholarship for one year abroad in U.S.A.
"	Dev Raj Mohanta, B.Sc (Mysore)	Lyallpur Honours School (Mysore)	Cotton Entomology	Do	Secured Government Scholarship for one year abroad in U.S.A.

RESEARCH STUDENTSHIPS—contd

Year of appointment	Name	Where posted on appointment	Branch of Cotton Research in which scholarship granted	How now employed	REMARKS
1927	Uma Shankar, M.Sc (Allahabad)	Cawnpore	Cotton Entomology	Assistant Professor of Zoology and Entomology, Agricultural College, Cawnpore Unemployed	Obtained Doctorate at Edinburgh
"	Shridhar Shamrao Rane, M.Sc (Benares Hindu University)	Institute of Plant Industry, Indore	Cotton Physiology	Awarded a Foreign Scholarship by the Indian Central Cotton Committee	
"	Sant Singh Verma, M.Sc (Benares Hindu University)	Dharwar	Cotton Physiology in connection with Cotton Yield Investigation	Obtained Ph.D (Lond.)	
"	Lakshmi Narayan Mathur	Institute of Plant Industry, Indore	Cotton Breeding	Crop Botanist, Ujjain	
"	M.Sc (Punjab)	Cambay	Do	Gwalior Department of Agriculture Unemployed	
"	Kadaba Rangaswamy, M.Sc (Calcutta)	Industry, Indore	Cotton Agronomy	Agricultural Officer	
"	S. Shamsher Singh, M.Sc (Punjab)	M.Sc Dharwar (Bombay)	Cotton Mycology	Assistant Botanist, Madras Pompilurus and Physiological Scheme	
1928	K. Dharmarajulu,	Institute of Plant Industry, Indore	Cotton Entomology	Field Assistant, Parasite Work Pink and Spotted Boll worm Scheme, Puri	
"	Piao Mohan, B.Sc, Honours School (Punjab), M.Sc	Cawnpore	Do	Sand Agricultural Department, Inspector of Agriculture, Eastern Nara Circle, Mirpurkhas	
"	R. N. Ondiwani, B.Ag (Born bay)	Surat	Cotton Agronomy	Madras Agricultural Services	
"	M. Kanti Rao, M.A, B.Sc (Agric.) (University of Edin.)	Institute of Plant Industry, Indore	Do	Junior Research Assistant, Indian Central Cotton Research Laboratory, Matunga, Bombay	
"	C. Nanundayya, (Calcutta)	M.Sc Technological Research Laboratoty, Matunga	Cotton Technology	Technological Research Laboratory, Matunga, Bombay	

RESEARCH STUDENTSHIPS—contd.

Year of appointment.	Name.	Where posted on appointment.	Branch of Cotton Research in which scholarship granted.	How now employed.	Technological Assistant, Surat.	Assistant, Indian Central Cotton Committee.	Remarks.
1929	Sringabhuhatana, B.Sc	Technological Research Laboratory, Matunga, Bombay.	Re-Cotton Technology.	Marketing Department, Do.	Punjab Agricultural Do.	Do.	****
3	Bhanu Pratap Singh Bhullar, Lyallpur	Do.	Cotton and Economics.	Agricultural Do.	Do.	Do.	****
"	B.Sc. (Agric.) (Punjab).	Do.	Do.	Do.	Do.	Do.	****
"	Bhal Singh Gujjar,	Do.	Do.	Do.	Do.	Do.	****
"	B.Sc. (Agric.) (Punjab).	Do.	Do.	Do.	Do.	Do.	****
1930	Malan Lal Bhatia, M.Sc. (Punjab).	Do.	Entomology	Abrad for further study ..	Do.	Do.	****
"	Bhole Nath, M.Sc. (Punjab).	Institute of Plant Industry, Indore.	Cytology and Plant Breeding.	Genetical Assistant, Institute of Plant Industry, Indore.	Do.	Do.	Indian Central Cotton Committee.
4	Pran Nath Mehra, M.Sc. Sankard (Punjab).	Do.	Do.	Do.	Do.	Do.	Resigned.
"	Prabendra Nath Bhargava, Lucknow	Do.	Cotton Marketing and Economics.	Do.	Do.	Do.	****
"	M.A. (Lucknow).	Do.	Do.	Do.	Do.	Do.	****
1931	H. B. Sheathuri, B.Ag. (Bom., Surat, Gujarat Bay).	Do.	Do.	Do.	Do.	Do.	Resigned.
"	R. R. Dubo, B.Ag. (Nagpur), Nagpur	Do.	Do.	Do.	Do.	Do.	****
"	Santokh Singh Jaggi, B.Sc., Lyallpur (Agric.) (Punjab).	Do.	Do.	Do.	Do.	Do.	Do.
"	Doralesswami Ayyar, B.A., Madras.	Do.	Do.	Do.	Do.	Do.	****
1933	Krishna Ithari Lal, M.Sc. Lyallpur (Cal.), Ph.D. (Edinburgh)	Do.	Do.	Cotton Entomology Research Student ..	Do.	Do.	Under training.
1930	M. U. Parmar, M.Sc. (Bombay).	Do.	Technological Research Laboratory, Matunga, Bombay.	Re Cotton Technology Research Student.	Do.	Do.	Under training.
"	G. Ramal Rao, B.Sc. (Bombay)	Do.	Do.	Do.	Do.	Do.	Do.

RESEARCH STUDENTSHIPS—*contd.*

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Year of appointment	Name	Where posted on appointment	Branch of Cotton Research in which scholarship granted	How now employed	Remarks
1917	Uma Shankar, M.Sc	Cawnpore (Allahabad)	Cotton Entomology	Assist. Professor of Zoology and Entomology, Agricultural College, Cawnpore Unemployed	Obtained Doctorate at Edinburgh
"	Shridhar Sharmrao Rane, M.Sc	Institute of Plant Industry, Indore (Banaras Hindu University)	Cotton Physiology	Awarded a Foreign Scholarship by the Indian Central Cotton Committee	... .
"	Sant Singh Verma, M.Sc	Dharwar (Banaras Hindu University)	Cotton Physiology in connection with Cotton with Investigation	Obtained Ph.D. (Lond.)	... .
1918	" Lakshmi Narayan Mathur, M.Sc (Punjab)	Institute of Plant Industry, Indore	Cotton Breeding	Crop Botanist, Ujjain, Gwalior Department of Agriculture	... .
"	Kadaba Rangaswamy, M.Sc	Gumblapore	Do	Unemployed	... .
"	S. Sharmer Singh, M.Sc	Institute of Plant Industry, Indore (Punjab)	Cotton Agronomy	Agricultural Officer, Bihar State	... .
"	K. Dharmarajulu, M.Sc	Dharwar (Bombay)	Cotton Mycology	Assistant Botanist, Madras Pempahires and Physiological Scheme	Central Cotton Committee
"	Pare Mohan, B.Sc; Honours School (Punjab), M.Sc	Cawnpore	Cotton Entomology	Field Assistant, Parasite Work, Park and Spotted Boll worm Scheme, Punjab	Do,
"	R. N. Gidwani, B.Ag (Born bay)	Surat	Cotton Agronomy	Sind Agricultural Department, Inspector of Agriculture, Eastern Navs Circle, Murshidabad	... .
5	M. Kanti Raj, M.A, B.Sc	Institute of Plant Industry, Indore (Agri.) (University of Edin.)	Do	M. A. & M. Sc Agricultural Service	... .
"	C. Nanjundayya, M.Sc	Fechnology Research Laboratory, Matunga, Bombay	Cotton Technology	Junior Research Assistant, Technological Research Laboratory, Matunga, Bombay	Central Cotton Committees

RESEARCH STUDENTSHIPS—contd

Year of appointment	Name	Where posted on appointment	Branch of Cotton Research in which scholarship granted	How now employed.	Remarks
1933	Pringali Jahanan B.Sc	Technological Research Laboratory Matunga, Bombay	Re-Cotton Technology	Technological Sarat	Indian Central Cotton Committee
1934	1. Lal Pratap Singh Bhullar B.Sc (Agric) (Punjab) Bhai Ajab Singh Gulzar B.Sc (Agric) (Punjab) M. Lal Bhatia M.Sc (Punjab) Old Nath M.Sc (Punjab)	Loyallpur Do Do Do Indore	Cotton Marketing and Economics Do Entomology	Punjab Agricultural Department Do Abroad for further study	Do
1935	M. Lal Bhatia M.Sc (Punjab) Fran Nath Mehta M.Sc Sakrand (Punjab) Birendra Nath Bhargava Lucknow M.A (Lucknow) B.S. Sahgir B.Ag (Bom lax)	Indore	Plant Cytology and Plant Breeding Do	Geethcal Assistant Institute of Plant Industry Indore	Indian Central Cotton Committee
1936	R.C. Dube B.Ag (Nagpur) Nagpur	Nagpur	Cotton Marketing and Economics. Do	Do	Resigned.
1937	Santosh Singh Jaggi B.Sc Loyallpur (Agric) (Punjab)	Loyallpur	Do	Do	Resigned.
1938	Dorai Swami Ayyer B.Sc (Agric) (Madras)	B.A. Madras. Loyallpur	Do	Agricultural Botanical Research Scheme Madras Agricultural Service	Indian Central Cotton Committee
1939	Kriti na Mohan Lal D. (Loburh) M.U. I. Kumar M.Sc (Bombay)	Do	Cotton Entomology	Research Student	Under training
1940	G. Ramchandra B.Sc (Ternbary)	Ternbary	Re-Cotton Technology Do	Research Student	Under training
					Do

RESEARCH STUDENTSHIPS—contd

Year of appointment	Name	Where placed on appointment	Branch of Cotton Research in which scholarship granted	How now employed.	Remarks
1931 1	Sant Singh Verma, M.Sc (Banaras Hindu University)	Foreign Research Studentship Imperial College of Plant Physiology, London Sciences and Technology, London Training Grants	Branch of Cotton Research in which scholarship granted	Completed training, July 1935 Obtained Ph.D of London University	Completed training, July 1935 Obtained Ph.D of London University
1933 2	S N Venkataswami, B.A., B.Sc (Agr.) (Madras)	Cotton Statistics Calcutta	Branch of Cotton Research in which scholarship granted	Under training	Under training
1936 1	C Jagannatha Rao, B.A (Madras) P Abraham, B.A (Madras)	Cotton Physiology Cotton Cytology Foreign Training Grants	Branch of Cotton Research in which scholarship granted	Research Student Not yet joined	Research Student Not yet joined
1933 2	M Taekur Ahmad, B.Sc (Agr.) (Punjab)	Trinity College, Cambridge	Branch of Cotton Research in which scholarship granted	Assistant Entomologist Imperial Institute of Agricultural Research, Paris	Assistant Entomologist Imperial Institute of Agricultural Research, Paris
1934 1	G B Patel, B.Sc (Bom bay)	University of California, U.S.A	Branch of Cotton Research in which scholarship granted	Research Student	Completed training July 1936 Obtained M.Sc of California University
1934 2	M A Sharma Iyengar, B.Sc (Bombay)	Tour in Hungary (at Kiskunsag) England and Egypt	Branch of Cotton Research in which scholarship granted	Study of Kiskunsag (at Kiskunsag) lands and cultivation of superior Egyptian cottons with special reference to soil and environmental conditions	Study of Kiskunsag (at Kiskunsag) lands and cultivation of superior Egyptian cottons with special reference to soil and environmental conditions
1936 1	Nazir Ahmed, M.Sc (Punjab)	Imperial College of Entomology Imperial College of Entomology Sciences and Technology, London	Branch of Cotton Research in which scholarship granted	Research Student	Under training
1936 2	Kidar Nath Trehan, M.Sc (Punjab)	Applied Entomology	Branch of Cotton Research in which scholarship granted	Not yet joined	Not yet joined

" Indian Central Cotton Committee " in the remarks column indicates a post paid for from one of the Committee's Research Grants

